

PROCEEDINGS
of the Twelfth Annual
WESTERN FOREST INSECT WORK CONFERENCE

Berkeley, California

March 1-3, 1961

Not for Publication
(For Information of Conference Members Only)

Prepared at
Division of Timber Management
U. S. Forest Service, Region 2
Building 85, Denver Federal Center
Denver, Colorado



W.F.I.W.C., Berkeley, California - March 1-3, 1961

- Row 1. Left to right: Ralph Hall, Samuel Graham, Bill Wilford, Amil Landgraf, Tom Koerber, John Schenk, Roy Shepherd, Ray Lejeune, Ken Wright, Paul E Hawthorne, W. V. Benedict, Wally Guy.
2. Frank Yasinski, Walt Cole, Rob Reid, Bob Stevens, George Struble, Doug Ross, Dave Scott, Ken Swain, Blair McGugan, Val Carolin, M. E. Thede.
3. Al Rivas, M. J. Stelyer, Leonard Lindberg, Richard Smith, David Evans, Hasan Canakcioglu, Les McMullen, Ken Graham, Jerry Knopf, Tom Silver, Geo Marshal, Phil Johnson.
4. D. A. Hester, Dick Washburn, Ernest Pearson, Malcolm Furniss, Galen Trostle, William James, Homer Hartman, Paul Lauterbach, Ron Stark, Boyd Wick Downing, Bob Maben.
5. John Pierce, James Averell, William Bedard, J. P. Vité, Norman Johnson, Eugene Drown, William Ferguson, David Wood, Dick Bushing, Gary Pitman, R Whiteside.
6. Tom Harris, Bill McCambridge, William Rose, David Bein, Ned Simmons, Daniel Dotta, John Masson, Don Dahlsten, Eric Jessen, C. J. DeMars.
7. Benton Howard, Russel Mitchell, Edward Sturgeon, Clifford Johnson.
8. Harold Offord, Willis Wagner, Archie Tunnock, Fred Dickinson, W. T. Bailey.

INTRODUCTION

THE PROCEEDINGS INCLUDED HERewith ARE FOR INFORMATION ONLY. THE MATERIAL INCLUDED IS TO BE CONSIDERED APPROXIMATED SUMMARIES OF PRELIMINARY FINDINGS. THE MATERIAL MAY NOT BE USED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF THE CONTRIBUTOR.

PROCEEDINGS
of the Twelfth Annual
WESTERN FOREST INSECT WORK CONFERENCE
Berkeley, California
March 1-3, 1961

EXECUTIVE COMMITTEE (Twelfth Conference)

B. H. Wilford, Fort Collins	-	Chairman
R. W. Stark, Berkeley	-	Immediate Past Chairman
A. E. Landgraf, Denver	-	Secretary-Treasurer
G. T. Silver, Victoria	-	Councilor (1959)
G. R. Struble, Berkeley	-	Councilor (1960)
D. O. Scott, Missoula	-	Councilor (1958)

R. C. Hall, Berkeley	-	Program Chairman
R. W. Stark, Berkeley	-	Program Co-chairman

EXECUTIVE COMMITTEE ELECT

B. H. Wilford, Fort Collins	-	Chairman
R. W. Stark, Berkeley	-	Immediate Past Chairman
A. E. Landgraf, Denver	-	Secretary-Treasurer
G. T. Silver, Victoria	-	Councilor (1959)
G. R. Struble, Berkeley	-	Councilor (1960)
N. E. Johnson, Centralia	-	Councilor (1961)

C. L. Massey, Albuquerque	-	Program Chairman
---------------------------	---	------------------

Prepared by the Secretary-Treasurer, Amel E. Landgraf, Jr., from summaries submitted by the discussion leaders, named under each section. Stenographic assistance was provided through the services of Mrs. A. E. Landgraf, Jr. and by the Division of Timber Management, U. S. Forest Service, Region 2, through the services of Miss Susan Heifner. Duplicating services were provided by U. S. Forest Service, Division of Operations.

COMMON NAMES COMMITTEE

Philip C. Johnson, Missoula	-	Chairman
Clifford E. Brown, Calgary		
Dr. V. M. Carolin, Portland		
Robert E. Denton, Missoula		
David Evans, Victoria		
Norman E. Johnson, Centralia		
George E. Struble, Berkeley		

EDUCATION COMMITTEE

Dr. Ron W. Stark, Berkeley	-	Chairman
Dr. Ken Graham, Vancouver		
Dr. J. A. Rudinsky, Corvallis		
Dr. H. S. Telford, Pullman		
Dr. J. P. Vite, Grass Valley		
Dr. R. C. Hall, Berkeley		
Dr. S. M. Sturgeon, Arcata		

UNPUBLISHED REPORTS COMMITTEE

Roy F. Shepard, Calgary	-	Chairman
-------------------------	---	----------

ETHICAL PRACTICES COMMITTEE

Russel W. Smith, Portland	-	Chairman
---------------------------	---	----------

TABLE OF CONTENTS

	<u>Page</u>
Introduction	
Minutes of Initial Business Meeting	1
Review of Current Forest Insect Conditions	
How Bark Beetles Effect and Kill Forest Trees - Callaham, Bedard, McMullen, Reid, Smith and Wood	4
How Defoliators Affect and Kill Trees - Silver, Mitchell, Wickman, Carolin and Cole	6
Insect Damage to Fire-injured and Killed Trees and Forest Products - Furniss, Hall, Dickinson, Scott, Ross and Lejeune	10
Ecological Effects of Insect Attacks in Forest Stands - Muelder, Eaton, Hopping, McCambridge, Vite and Graham	22
Techniques, Methods and Gadgets - Johnson	32
Minutes of Final Business Meeting	35
List of Current Research Projects	40
Alaska Research Center	40
British Columbia	40
Alberta	42
Pacific Northwest Forest & Range Experiment Station	45
Oregon State University	45
Pacific Southwest Forest & Range Experiment Station	45
University of California	47
Boyce Thompson Institute	47
Intermountain Forest & Range Experiment Station	48
University of Idaho	49
Rocky Mountain Forest & Range Experiment Station	50
Membership Roster	51
Common Names Committee.....	64
Progress Report.....	64
Minutes of Meeting.....	65

MINUTES OF INITIAL BUSINESS MEETING

March 1, 1961

The Chairman called the meeting to order at 9:00 a.m. in the Alumni House, University of California, Berkeley, California.

Welcoming addresses were given by the following:

Dr. Henry Vaux, Dean, School of Forestry, University of California

Dr. Roy F. Smith, Chairman, Department of Entomology & Parasitology,
University of California

Dr. R. K. Arnold, Director, Pacific Southwest Forest & Range
Experiment Station

The following people, attending the conference for the first time, were introduced:

Dr. Milton Stelzer
Dr. William Ferguson
Gerry Pittman
Dr. John A. Schenk
Bill R. Rose
John Masson
Paul Buffam
Dr. Carl Huffacker
Eric Jessen
Ned Simmons

Dr. Sam Graham
Robert Shot
John Mahoney
Dr. P. S. Messenger
Mr. Ken Swain
Mr. R. H. Hunt
John Pierce
Charles Schaefer
Dr. D. W. Muelder

Ralph Hall, Program Chairman, outlined the program and other arrangements for the meeting. The banquet and children's hour were scheduled at A. Sabella's, Fisherman's Warf, Thursday evening, March 3.

Program Chairman, Ralph Hall, acknowledged the help of Dr. Ron Stark, Dr. Tom Silver, Dr. Ken Graham, Dick Smith, Bill Bedard, and Bob Stevens.

Norman Johnson advised panel members who are on Friday's program to set up their material prior to the meeting.

George Hopping moved that the Treasurer's report be approved as read. Seconded by Ken Wright. Carried.

Ralph Hall moved that the minutes of the final business meeting be approved as read. Seconded by George Downing. Carried.

The Secretary outlined the recommendations agreed upon by the Executive Committee meeting, held the evening of February 28. Council recommendations arising out of the Executive Committee were as follows:

1. That the Nominating Committee for selection of a Councilor to serve a three-year term on the Executive Committee, consist of Charles Eaton, Chairman; aided by Dr. Ken Graham and Ray Lejeune.

2. The new Western Forest Biology Laboratory at Corvallis will not be ready by 1962. Therefore, the Committee recommends that Phoenix, Arizona be considered for the 1962 meeting and the Portland area for the 1963 meeting.

3. That the theme for the 1962 meeting be, "Insects Affecting Regeneration." In addition, part of the program should consist of a seminar at which contributors of new research, particularly the younger researchers, would be put on the program; suggested that laboratory leaders propose to the Program Chairman names of researchers and topics for the seminars; recommended that the prepared material to presented informally.

4. That the Conference purchase reprints of the Education Committee's report "Foresters Look at Forest Entomological Training." Reprints to be distributed to the membership and to all colleges and universities. The Conference will purchase 300 copies of the reprint providing that the cost does not exceed \$50.00.

5. That the list of current research projects be included again in this year's proceedings.

6. That Roy Shepherd be appointed as Chairman of the Indexing Unpublished Reports Committee.

7. That the insect conditions be continued, possibly reducing the mailing list.

8. That the conference consider a newsletter. This is not to be an actual organ of the conference.

Norman Johnson requested that a list of the Executive Committee's recommendations be posted. ~~Mr.~~ Eaton offered to mimeograph the list of recommendations. This was done; 100 copies were ready for distribution that afternoon.

Norman Johnson and ~~Dr.~~ Stark outlined their proposal of publishing a bi-monthly newsletter to cover progress of recent research. The letter would be similar to that being published in Canada where it is considered as a scientific note.

~~Don~~ Stark pointed out that the letter need not be considered as or even published by the Conference. ~~Dr.~~ Stark and Norman Johnson both agreed to take the initial steps in starting the letter. They did suggest that possibly the Conference might consider donating money for the first two or three letters. ~~Don~~ Stark felt that once the newsletter was put out that there would be enough interest in it that entomologists would be willing to subscribe to it and eventually it would stand on its own feet financially.

Reports of the Standing Committees:

Phil Johnson, Chairman of the Common Names Committee, reported that the Committee was reorganized and they had republished two lists of proposed common names. These lists were distributed to the membership prior to the meeting.

Phil Johnson announced that the Common Names Committee would meet the evening of March 1 at the Hotel Durant.

B. Ron Stark, Chairman of the Education Committee, reported that their report, "Foresters Look at Entomological Training," had been submitted to the Journal of Forestry in April, 1960. The report had been accepted but as yet had not appeared in print.

Ron Stark stated that the Education Committee is to be reactivated this year.

Jack Bongberg, Chairman of the Ethical Practices Committee, reported that he and his staff were carefully screening candidates and that a report would be forthcoming.

Dick Washburn reported that several items had been misplaced at the Ogden meeting but were found later.

The Chairman announced that discussion of other issues would be held over until the final business meeting on Friday, March 3.

The meeting was adjourned at 10:00 a.m., March 1.

METHODS OF EVALUATION OF INSECT POPULATIONS

March 1, 10:15 - 11:00 a.m.

Dr. C. A. Fleschner

REVIEW OF CURRENT FOREST INSECT CONDITIONS

IN WESTERN NORTH AMERICA

March 1, 11:00 - 11:45 a.m.

C. J. DeMars

I. HOW BARK BEETLES AFFECT AND KILL TREES

March 1, 1:00 - 3:00 p.m.

Moderator: R. Z. Callaham

Panelists: W. D. Bedard

L. H. McMullen

R. W. Reid

R. H. Smith

D. L. Wood

Effect of Pines on Attacking Bark Beetles

R. H. Smith

One of the earliest references to the effect of trees on bark beetles was by Hopkins in 1902. He believed that Dendroctonus ponderosae could not oviposit and extend its gallery until resin flow had ceased. Person reached much the same conclusion for D. brevicomis in 1931. At about the same time Gordon showed that fractionated resin derivatives could be toxic to D. brevicomis. In the early 1950's Miller and Callaham conducted an investigation of the effect of pine trees on bark beetles by using the forced-attack technique. They concluded that forced-attacks by bark beetles were less extensive and less typical on non-host pines than those on host pines. They suggested resin as a primary factor in these results. Callaham then conducted an intensive investigation to correlate quantitative resin flow with tree risk as defined by the California risk rating system. Though this correlation was not convincingly strong, he did find the cessation of resin flow from high-risk trees was much sooner than that from low-risk trees. He conjectured from this that the prolonged flow of resin from low-risk trees prevented oviposition by the beetle and that the early cessation of flow from high-risk trees permitted successful establishment of a brood. Smith then turned to an investigation of the toxicity of pine resins to adult Dendroctonus. A technique measuring the toxicity of pine resin vapors was employed after it was found that the unstable nature of fresh pine resin made stomach and contact toxicity experiments difficult to establish and evaluate. Early results with the technique suggested the hypothesis that bark beetles can tolerate saturated resin vapors of host pines but cannot tolerate those of non-host pines. In the most recent research this hypothesis was strongly substantiated for hard pines but was erratic for soft pines. Thus, circumstantial evidence points to a close relationship between the failure of bark beetle attack and some property of pine resin.

Abstract by Reid

The moisture content of the outer sapwood of non-infested trees is normally high, about 85 to 165 percent of oven dry weight. In trees that have been infested for one year the sapwood moisture content can be as low as 16 percent. There is a steep moisture gradient from a high about 160 percent in the outer sapwood to a low of about 32 percent in the heartwood. The moisture content in the center is slightly higher than in the adjacent wood. In infested trees the sapwood moisture is greatly reduced within a year after the attack but moisture in the heartwood is not altered appreciably. Trees infested early in the season drop to a lower moisture content by fall than the trees infested later in the season. In non-infested trees there is a diurnal and a seasonal moisture march; these do not occur in infested trees. The rapid moisture loss in the sapwood of infested trees is associated with blue-stain infection and successful establishment of bark beetle broods.

The Effect of Attack Density on the Behaviour of Parent Douglas-fir Beetles

By McMullen

The behaviour of beetles attacking host material will be influenced by conditions the beetles may find under the bark. The effect of competition, as measured by attack density on the Douglas-fir beetle was studied in four-foot logs under field and cage conditions.

Gallery length and eggs per inch of gallery were reduced at high levels of competition. The former effect is probably related to the fact that parents abandoned galleries sooner at high attack densities. The reduction in oviposition can at least be partially attributed to the fact that a small portion at the beginning and end of the gallery is not used in oviposition; with more and shorter galleries the proportion of unused gallery would increase.

The parents which abandon their galleries are capable of re-attacking. Thus, when high attack densities do occur, the insects can attack more host material.

Microorganisms, Beetles and Trees

By Bedard

There is more to tree-killing by bark beetles than bark beetles and trees. Microorganisms including blue stain, yeasts, other fungi, bacteria, Nematodes and mites are all introduced into a tree with the attacking beetles. The tree, the beetles, and the microorganisms interact to produce important end products: ie: dead or live trees, reduced or greatly multiplied beetle population, etc. Our goal is to understand these interactions in order to predict and/or manipulate for an end product. In such an analysis it is extremely important to maintain perspective. Excised relations may not and probably do not function the way they do in the integrated whole. Add to this the fact that relations unimportant one year may be paramount to next year's prognosis.

Abstract

Past observations have shown that a large number of attacks are necessary before bark beetles can successfully overcome a tree. Recent studies have indicated that a mass influx of beetles only occurs when initial attacks by a few beetles are successfully established. Plots were established to test the applicability of "oleoresin exudation pressure" as a method in determining the susceptibility of second growth ponderosa pine to infestation by Dendroctonus brevicornis and D. monticolae. The same percentage of trees in both the low (less than 4 atm.) and high (more than 4 atm.) o.e.p. ranges received initial attack but the largest percentage of trees mass attacked occurred in the low range where the initial attack was successful. In other experiments successful initial attack by Ips confusus did not occur until the o.e.p. was nil or negligible. Once the "pioneer" beetles were established, a secondary attraction was created resulting in a mass attack. Temporary impedance of the pioneer attacks delayed the mass attack.

II. HOW DEFOLIATORS AFFECT AND KILL FOREST TREES

March 1, 3:13 - 5:00 p.m.

Moderator: G. T. Silver

Panelists: R. G. Mitchell
B. E. Wickman
V. Carolin
W. E. Cole

Silver: The topic of this panel should probably be put into another form as many entomologists would like to know the answer to the question "How do defoliators affect trees?" Many reports on infestations have concluded with "although defoliation has been heavy the insect population is declining. Barring any unforeseen factors the trees should recover and there will be no permanent damage to the stands". In statements like this we are thinking of defoliation in terms of tree mortality, and tend to ignore the other losses and effects which are incurred.

The effects of defoliation to forest trees are usually considered under the well established headings of 1) loss of radial increment, 2) top-kill resulting in forked stems, bayonet stems, and subsequent loss of good tree form, and 3) tree mortality. To these must be added other consequences of defoliation such as; 4) the effect of one or two year's heavy defoliation vs. four or five years of continuous heavy defoliation, 5) what is the percentage of total defoliation from which a tree cannot normally recover, 6) is there any evidence that trees weakened by defoliation are more susceptible to bark beetle attacks, 7) is there any evidence or records of tree diseases being introduced through dead tops which would have a serious effect on tree growth or values, and 8) tolerance of the various tree species to defoliation

Some foresters claim that loss of radial increment is not a serious effect of defoliation on the theory that you can't lose what you have never had. This negative approach will undoubtedly be corrected as forests come under more intensive management. We should therefore make every effort to know what the loss of radial increment is in association with the degree of defoliation and the length of the outbreak.

The true effect of top-kill on trees and stands is little known, but general assumptions can be stated. Top-kill would have a much greater effect on a stand only 40-50 feet in height than on a stand 100 feet tall. Forked tops and bayonet stems would be very detrimental to tree form in the younger stands, and the introduction of rots at this height would result in heavy cull loss by the time the timber reached merchantable size. In any case we must know the degree of defoliation leading up to top-kill so the predictions can be made in future outbreaks.

In every infestation the chief concern is tree mortality, which leads to another problem. How heavy must tree mortality be before it is serious? A forester recently calculated that 2 per cent tree mortality in a stand averaging 40,000 bd. ft. per acre represented a loss of \$10.00 per acre. This figure was based on lost stumpage value, the cost of building logging roads for timber which should have borne the cost of construction and the cost of snag falling. If it is simple mathematics for a company to be willing to spend \$2.00 per acre to prevent even 2 per cent kill, it goes without stating that they would consider any heavier mortality a serious loss. The point here is that if it is desirable or economically sound to control insect outbreaks to prevent 2 per cent mortality, can we as entomologists, appraise an outbreak to such a fine degree of accuracy as to predict tree mortality within these fine limits. I feel that this accuracy is impossible because there is little doubt that recovery of heavily defoliated trees depends to a very large extent on weather conditions which are as yet unpredictable, and on site factors, age, tree species, etc.

Before we can determine how defoliators affect trees we must know more about the fundamental principles of tree physiology. Studies on tree physiology and the effects of defoliation on trees must also include climatology. If we ignore this very important factor we could obtain conflicting results as to the effect of defoliation which would be most difficult if not impossible to reconcile.

Mitchell - Balsam Woolly Aphid

The scope of this talk is to discuss the findings of gout and trend plot studies from the stand point of host susceptibility, resistance, and growth.

Gout Studies - Many European firs are naturally infested but damage is nil. Asian true firs support natural infestations and sometimes suffer moderate gouting. Every North American species tested has shown severe gouting reactions to balsam woolly aphid but not all are capable of supporting natural infestations. Twig enlargement is associated with aphids in the immediate vicinity; aphids settling on the top of the twig cause downward crook and

an infestation on the underside causes twigs to bend upwards. The more vigorous the twig, the greater the distortion and the more difficult it is to prevent bud flush. As the host is weakened, by previous aphid infestations or other factors of environment, bud inhibition becomes less difficult.

Trend Plot Studies - Balsam woolly aphid infestations stratify themselves in the stand with the dominant trees being the most susceptible and the suppressed trees the least.

Trees characterized solely by crown infestations suffer considerable crown deterioration and loss in height growth but seldom die; recovery is often apparent after 3 to 5 years of infestation. Pacific silver fir and subalpine fir usually die after 2 to 4 years of heavy stem infestation; radial growth at breast height does not appear significantly reduced and crown deterioration is usually nil. Grand fir often survive heavy stem infestations but height and radial growth decline.

Mortality in Pacific silver fir is correlated with the number of stem infestations present; the more stem attacks there are, the greater the mortality, and, the better the growing site and greater the number of stem attacks. Correlation between site and mortality is also apparent in sub-alpine fir.

Bark beetles were not found associated with Chermes-weakened trees.

V. M. Carolin - Effect of spruce budworm defoliation on tree growth and survival.

This work was designed to study the relationship between populations and damage to Douglas fir and white fir, both on an individual tree and on a stand basis. Results to date show that per cent defoliation of new growth and bud-killing are not consistently related. The degree of defoliation between trees is more accurately shown by the use of field glasses than by shoot tallies, with time limitation involved. Also, ocular estimates of defoliation showed correlation between larval counts two out of three times. Damage on white fir trees was much greater than on Douglas-fir trees, with similar budworm populations. Tree damage classes shown related to degree of reduction in radial increment. Damage surveys are conducted on this basis.

B. E. Wickman - Mortality and Growth Decline in White Fir Defoliated by Douglas Fir Tussock Moth.

Studies were conducted at two localities. The outbreaks on the Stanislaus National Forest occurred from 1954 to 1956, and was controlled in 1956 with 1 lb. of DDT to 1 gallon of diesel oil in July 1956. An outbreak at Mammoth Mt. occurred from 1933-37. The effects of defoliation were studied from 1938-42, but the results were never published.

Twenty-three 1/2 acre plots were established throughout the infested area on the Stanislaus National Forest. Defoliation was estimated on all plot trees, and tree mortality recorded annually. Radial increment was

measured on three discs cut from 40 trees covering all degrees of defoliation.

The main results were:

Mortality due to defoliation alone was mainly in the smaller diameter classes. Almost 25 per cent of the white fir in the 2-inch to 6-inch diameter classes were killed. The largest tree killed by defoliation alone was 22 inches d.b.h.

Mortality caused by defoliation and bark beetles occurred mostly in larger trees from 16 to 50 inches d.b.h. Sixty-five per cent of the trees 90 per cent defoliated died and contained Scolytus bark beetles and Tetropium sp. This seems to demonstrate the preference of bark beetles for the severely defoliated trees.

Twenty per cent of the green stand volume on the Stanislaus National Forest (11,071 bd. ft. per acre) was killed in the four year period from 1956 to 1959. Twenty-nine per cent of the green stand volume on Mammoth Mt. (10,597 bd. ft. per acre) was killed in the four year period from 1938-1941. It is possible that the nine per cent greater mortality at the Mammoth plot was because the infestation was uncontrolled and last five years vs. three years for the other outbreak.

Top-kill was heavy in both infestations. In the Stanislaus N.F. outbreak 12 per cent of the heavily defoliated white fir had permanent top kill, and many more had deformed tops from temporary kill.

The loss of radial growth was severe where defoliation exceeded 50 per cent. Growth loss was most pronounced in tops, but was noticeable at d.b.h. Radial increment started to recover the year following the last heavy defoliation, and was almost back to normal in three years.

Summary - The Douglas-fir tussock moth can wreak terrible havoc in white fir. The tolerance level for this insect is zero years of heavy feeding. This study suggested that a one-year hesitation before applying control cost at least 5,000 bd. ft. per acre of prime, commercial white fir.

W. E. Cole - Loss of increment due to defoliation by the pine butterfly.

The pine butterfly began increasing in 1950 on the Boise National Forest in southern Idaho and by 1953 severe defoliation was evident on approximately 250,000 acres. The infestation was controlled in 1954. Studies were conducted to determine the effect of defoliation on increment and mortality of ponderosa pine due to defoliation.

There was a significant difference in radial growth between the pre-, during, the post-defoliation periods. Defoliation caused a 39 per cent loss, or failure to gain in increment. Based on 183 bd. ft. of annual increase of volume per acre, this percentage amounted to 72 bd. ft. annual loss per acre,

or a total loss of some 145 million bd. ft.

Tree mortality equalled 1.3 per cent of the stand, or 0.6 per cent of the volume. This compared to the 1922-23 epidemic (uncontrolled), which resulted in 26 and 36 per cent losses respectively.

Mean annual radial growth was approximately equal between the two groups of trees studied during these two epidemics. The damage curve shows that growth was materially reduced during the 3-year period of defoliation and continued for five years thereafter.

The two-level sequence technique was applied in these studies. The short cut sampling technique for the vertical growth sequence appears to be applicable for ponderosa pine of all ages.

III. INSECT DAMAGE TO FIRE-INJURED AND KILLED TREES AND FOREST PRODUCTS

March 2, 9:00 - 11:45 a.m.

Moderator: M. M. Furniss

Panelists: R. C. Hall
F. B. Dickinson
D. O. Scott
D. A. Ross
R. A. Lejeune

Forest products insects consist of two main types: (1) those which infest green and seasoning wood (ambrosia beetles, bark beetles, and wood borers), and (2) those which infest seasonal wood (termites, lyctus powder post beetles and the old house borer). The panel will discuss insects belonging to the first group.

Research on products insects has been neglected, especially in the West. Most of the past work was conducted in the eastern and southern states beginning in 1912 at East Falls Church, Virginia. Subsequent work was carried on at Ashville, N.C., New Orleans, La., and Beltsville, Md. A good history of such work was written by R. A. St. George entitled "Highlights of 50 years of research on insects attacking forest products." Ent. Soc. Wash. Feb. 7, 1957.

Review of available information on this topic points up the need for better information on amount and value of loss. With few exceptions, studies of degrade and dollar loss have not been conducted. Such information would emphasize the importance of products insects and should result in expansion of research on them.

Other obvious research needs include the interrelationship of products insects and fungi; species involved and their habits, importance and control. Mr. L. W. Orr emphasized some overlooked aspects of products insects in his article entitled "Protecting Forest Products from Insects." Jour. Forestry, Sept. 1959. He cites the TRR conclusion that we will

soon need to rapidly increase production of timber to keep pace with our expanding population. Anything that can be done to make wood in use last longer will help to extend the supply by cutting down on replacement. He points out that lumber and logs from second growth are less resistant than those from old growth. This fact plus certain present-day building practices can lead to increased damage in use and consequent increased rate of replacement. Unless better ways of preventing deterioration of wood are developed and practiced, substitute materials are likely to be used where wood was considered best.

Insects and Fire

R. C. Hall

Prompt salvage is the key to minimizing losses caused by insects on burns. There are two major things to consider in a fire-salvage program to minimize damage from insects. The first consideration is the recovery of maximum values in the trees killed outright by fire, and the second consideration is the removal of the severely weakened, but still living, trees which will act as a reservoir in building up big populations of primary bark beetles.

In summer and early fall burns, secondary wood borers will frequently attack before the fire is controlled. After the first month these borers will have progressed to the point where they have entered the wood to the depth of the slab cut. From then on lumber values deteriorate rapidly, and after about 4 months certain lumber values may be reduced by as much as \$250 per thousand.

The primary bark beetles do not attack the fire-killed trees, but their preference is for trees severely weakened by fire. The more severe the damage the greater the chance of attack.

Early studies by Miller and Patterson showed that where salvage of fire-injured trees had been promptly carried out only slight increase of the western pine beetle infestation occurred within the burn.

Studies on major burns in California since 1955 bear this out. The 1955 McGee and Haystack burns, where prompt salvage was not possible, had spectacular losses develop the second year after the fire. In comparison the Merrill, Harvey Mt. and Sugar Loaf fires in the same timber type and burning on approximately the same date were promptly salvaged with minimal losses occurring.

A study of a recent small burn of 32 acres, which occurred on July 21-23 in the Browns Flat area on the San Dimas Experimental Forest, showed that the buildup of the western pine beetle was very rapid. At the time of the fire there were 2 infested trees; in the following overwintering generation there were 33 infested trees. These were predominately those trees severely injured by fire. Not a single tree was attacked which had more than 25 per-

cent of the crown green. The average tree infested had only 3 percent of the crown green. The Browns Flat burn, though small, serves to illustrate the explosive population potential of the western pine beetle in ponderosa pine following a fire.

Degrade Due to Borers

F. E. Dickinson

In discussing wood deterioration as related to products produced from fire and/or bug-killed trees, my remarks for the most part will be concerned with the conversion of the material into lumber. Deterioration of wood products from trees killed either by fire or bugs may result from any one or a combination of the following: stain caused by fungi, holes caused by insects, and decay caused by fungi.

The most important stain caused by fungi is blue stain, sometimes called sapstain as it is confined to the sapwood. Blue stain and/or other fungus stains have little or no effect on strength properties of wood; the primary effect is that of appearance. Effect on appearance is also of importance in considering deterioration from holes caused by insects. Holes can, of course, make the board unsuitable for certain uses and if holes become plentiful, there will be some effect on strength.

Decay is the most serious of the three types of deterioration. Even with incipient decay we have considerable strength loss as well as loss in appearance of the material. As decay advances, the strength loss is such that the material becomes completely unusable.

Most of the timber being manufactured in sawmills in California goes into boards either of finish, factory or common grades, or into small dimensions, that is 2 x 4's, 2 x 6's, etc. I have heard from various sawmill men from time to time that in milling pine lumber and associated species, the break even point is about at the #3 board, meaning that material recovered which rates above #3 is a profitable item whereas below #3 is a losing item. Thus, the finish grades, #1 and #2 common and the shop grades have to carry not only the costs of milling themselves, but must make up for the loss incurred with the lower grades. It is common knowledge with all of you that our top grades, whether they are finish or shop, come from the outer portions of the log. Deterioration in the tree by any one or all of the three of the causal factors given above starts at the outer part of the sapwood and works progressively inward. Thus, the highest quality material from the standpoint of appearance is degraded first and the lower quality later on.

Let's just take a quick look at what these three deterioration factors do with reference to degrading lumber. Remember that we are primarily concerned with what is happening to the grade of the outer portion of the bole; that is, that portion from which you would normally get your D and better finish grades as well as your top shop grades.

Just a word about stained and decayed wood for pulp. Stained wood is undesirable for pulp inasmuch as the resultant pulp presents a bleaching problem somewhat more severe than normal wood. Decayed wood produces a low yield and a low strength pulp.

In timber salvage, blue stain is the most important deterioration factor during the first year; in following years insect holes and decay become extremely important. Stain organisms are introduced into the tree bole either by being carried in by insects such as bark beetles, or by the spores entering through openings provided by the insects. Optimum conditions for development of stain are from 75-85° F. Other necessary conditions include presence of moisture and air. Moisture is an important controlling factor as stain will not develop if the wood is at a moisture content of 20 percent or less or is saturated. The moisture content of wood in a freshly killed pine or fir tree is somewhere between these extremes.

Decay fungi are probably also introduced by insects, either primary or secondary attackers, as well as getting to the wood through bark cracks or other openings. It would appear then that the rate of deterioration of standing timber depends on the activity of insects at the time of and following a burn. Presumably timber which has been fire-killed during the summer or early fall prior to the cessation of flights by insects can very well be subject to damage starting during the fall period.

In discussing the deterioration which may occur, the influence of species should be considered. With reference to stain, studies have shown that white fir sapwood does not stain severely, whereas sugar pine sapwood stains severely and quite rapidly. Ponderosa and jeffrey pine sapwood is much like white fir and does not blue stain severely. Thus, blue stain is of primary importance in the pines, and can have a severe degrading effect on the sapwood. The total effect is greater in ponderosa and jeffrey pines than in sugar pine because the sapwood is thicker in the former.

Sapwood of all of these species has little or no resistance to decay and, in general, sapwood is not salvagable much beyond the second year in sugar pine and white fir. Some Douglas-fir and ponderosa pine sapwood may be salvagable during the third year but would be of extremely low quality. Heartwood of all of these species does have some resistance to decay. White fir is lowest on this list. Reports indicate that little may be salvaged of white fir heartwood after the third or fourth year. In ponderosa and jeffrey pines, decay is somewhat more retarded. In sugar pine, heartwood has been salvaged from large logs as long as ten years or more after a fire. Decay in Douglas-fir heartwood proceeds rather slowly and some salvage of large diameter trees has been possible fifteen to twenty years after death from fire. With all of these species, smaller trees have much shorter salvage periods.

While as indicated earlier, blue stain is not of too much concern in Douglas-fir, the thirty to sixty day period, if the fire occurred during June, July, or August, could well allow the loss of quality in pine because of blue stain.

What about control once the log has been manufactured into lumber? Certainly, if there is stain in the lumber nothing can be done to remove it, however, the normal procedure for preventing stain should be followed in order to prevent the stain from developing to a greater extent. This can be done by using an anti-stain dip at the green chain particularly if the lumber is going into the yard, or by putting the lumber through a dry kiln. Once the wood is below 20 percent moisture content, danger of staining is past unless the wood is again brought up to a moisture content level above this. As far as insect attack is concerned if borers have already gotten into the wood and larva are present, they can continue to develop and work. Steaming the lumber in a kiln at 135°F. with live steam for an hour or two is generally sufficient to kill the insects.

Decay is much like stain. Reducing the moisture content will prevent continuation of decay in manufactured lumber. Here again, future elevation of the moisture content above 20 percent can cause the decay to continue.

One further point, considerable information exists on the rate of deterioration of killed timber but only in terms of the loss of value and quality in log or tree form. More information on the effect on plywood, pole and lumber quality recovery would be helpful in determining dollar loss. Our knowledge in terms of product loss is based on opinion and sketchy observations. We need facts based on well planned observations.

Problems Involved in Prompt Salvage

D. O. Scott

Forest administrators have long recognized the economic importance of dead timber. As early as 1907 E. R. Hodson published a U.S. Forest Service circular on the use of dead timber.^{1/} The results of this study stressed the value of insect and fire killed trees. He found checking was the principal defect which appeared soon after the death of the tree. He recognized the time element as an important factor in salvaging insect and fire killed timber.

^{1/}USFS Circular #113, "Use of dead timber in the national forest" by E. R. Hodson. 4 pages, 1907.

Because deterioration of insect and fire killed timber starts soon after trees die, forest managers are cognizant of the limited time available before dead trees become unsuitable for use or are reduced in value to a point of diminishing returns. Three of the more important factors influencing the rate of deterioration within a single tree species are the causal agent producing mortality, elevational location of the dead trees, and whether the trees are scattered in a green stand or in a large area with almost total mortality.

Granted that some dead timber stands many years and is salvable for pulp material we feel that to capture the greatest value from insect and fire killed timber, salvage sales must be prepared, approved and sold promptly. However, this process is not always as easy as it sounds because many factors must be considered for each proposed sale. Some of the most important items are staffing and financing preparatory work, accessibility, mill capacity, and market conditions.

1. Staffing and financing salvable insect and fire killed timber

Large insect outbreaks, such as the Engelmann spruce beetle epidemic in Montana and northern Idaho, usually are financed adequately to provide for detailers who organize and direct the initial stages of a large control project. Small insect control jobs, however, must be handled by the regular organization which often means shifting personnel. In many cases this means the regular timber sales effort must be shifted to salvage sales.

2. Accessibility

It has been stated that it will take 20 to 30 years at the present rate of cutting before the merchantable timber stands in the Northern Region (Region 1) will be put under intensive management. One of the major reasons for this long period is the lack of roads to and through these timber stands.

This lack of access was well demonstrated during our spruce beetle epidemic of 1952-1958 when the logging-for-control program was developed. Even with a \$9,268.00 appropriation we were unable to build roads fast enough to salvage all of the beetle killed trees. Two reasons were: (1) survey and design standards were too rigid; (2) emergency force account road construction was waived in favor of individual road contracts. It is true that the road construction contracts had completion dates, but usually these were not enforceable. Many of the road contracts were purposely extended over a two-year period to reduce the cost of construction. In many cases this was to our own detriment.

In July of 1960 the Northern Region experienced the most severe fire month in at least 20 years. Forest fires have always been a recurrent problem, but usually they occur in August and burned acreages are held to a tolerable loss figure. However, last year large areas of timber were burned and larger than usual salvage sales were consummated. The problem of moving

this fire-killed timber was recognized on two large fires even before the fires were controlled. Thus, all mop-up roads were bulldozed on grades compatible with secondary timber haul roads.

It is axiomatic that accessibility is one of the requisites for quick, efficient harvesting of insect or fire-killed timber.

3. Milling capacity

As time is the all important item in capturing the highest sawtimber values, sales must be prepared even beyond the milling capacity of the area. Therefore, all sales must be attractive enough that not only local mills will be willing to curtail cutting green trees to salvage dirty hard-to-handle fire-scorched timber, but also mills often considered outside the normal zone of competition would be interested.

In some areas, because of limited milling facilities and lack of outside interest it is necessary to curb regular sales programs to assure the greatest salvage effort.

4. Market conditions

Markets may be available or they may have to be developed. In the case of the Engelmann spruce beetle outbreak, a tremendous job salesmanship by industry was necessary before a spruce market could be established. Spruce lumber, once considered inferior, now commands an excellent price.

If difficulties in marketing different species is a problem, the most valuable species should be logged first. For example, a western white pine area would be sold and cut prior to sale preparation and control work in a dead larch-Douglas-fir area.

Lumber sales began to sag nationally in 1959. They have continued to drop until by midsummer 1960, it was clear that 1960 would be a year of serious sales losses in Region 1. Sales in July dropped 5 percent below June and were 11 percent below July of 1959. By September there was an increasing curtailment in mill production. This was the period when timber sales were being processed for insect and fire-killed timber.

Evaluation of Damage by Monochamus to Fire-Killed Spruce and Pine

D. O. Ross

Relatively few investigations have been made on Monochamus in fire-killed timber. Parmalee (1941) demonstrated that greater numbers of Monochamus were reared from fire-killed timber than from samples of slash and wind-fall. Fire-killed white pine was preferred to fire-killed red and jack pine.

Richmond and Lejeune (1945) published the results of a study on deterioration of fire-killed white spruce by wood-boring insects in northern Saskatchewan. One of their findings was that there was no correlation of diameters and heights with wood borer populations.

Most trees burned in early summer were infested the same season as burned; additional infestation developed the second summer in the lightest burn class (burn classes were based on the amount of charring and dessication of bark).

The average maximum depth of penetration of completed Monochamus scutellatus tunnels was 3.7 inches, regardless of burn type, and ranged from 1.7 to 7.5 inches in depth.

Ross (1960) published an evaluation of "Damage by (Monochamus oregonensis)----- in fire-killed white spruce in central British Columbia." Conclusions were based on samples taken as follows: 10 standing sample trees 10-16 inches d.b.h. were chosen at random in each of three burn classes (light, moderate, severe, based on amount of charring of the bark) at 4 localities. The burns represented three different times during the summer of 1958. Ten 1-foot long cylinders were cut from each hole. The samples were 4 feet apart. The number of Monochamus entrance holes was recorded for each cylinder; and for the following table were converted to the average number of entrance holes per square foot.

Time of fire	Tree burn class			
	Light	Moderate	Severe	All classes
May 21 - 30	1.1	2.8	0.2	1.4
May 20 - 29	0.9	2.7	0.2	1.3
June 5 - 29	0.5	3.4	0.1	1.2
July 18 - 24	0.01	0.15	0	0.05

The lightest attack was on the "burn" that occurred latest in the season when the major Monochamus flight presumably was over.

The severe burn class had the lightest number of Monochamus entrance holes followed by the light burn class; the greatest number of entrance holes occurred in the moderate burn class. Of the emergence of adult M. oregonensis that occurred by the fall of 1960, from the early summer 1958 burns, about half the emergence was in 1959, the other half in 1960. The average maximum penetration of burrows in white spruce was about 3 inches.

Gardiner (1957) reported on the deterioration of fire-killed pine in Ontario and the causal wood-boring beetles. His data were based on 1-foot-long sections taken at 16-foot intervals along the sample tree holes.

He found no consistent relationship between the extent of charring and borer attack in trees that died at the same time; however, it was found that the time of tree death, which is influenced by severity of fire injury, affect the time and nature of the insect infestation. Trees that suffered severe fire injury died and became infested shortly after the fire. Moderately injured trees died, for the most part during the first winter and became infested the following spring, whereas lightly injured trees usually escaped infestation for at least a year after the fire.

In white and red pine, the proportion of holes made by Monochamus was greater in trees killed outright than in those that died later. Gardiner demonstrated that Monochamus spp. showed a market preference for white pine over red pine. They penetrated deepest in white pine and shallowest in red pine, jack pine being intermediate.

Near Vernon samples were taken by Ross from fire-killed ponderosa pine in two burns that occurred July 7-8, 1958. The average number of Monochamus maculosus entrance holes per square foot per tree by the fall of 1960 was 1.7 on the larger burn and 2.6 on the smaller burn.

The distribution of entrance holes up the trunk on ponderosa pine was somewhat similar to that of M. oregonensis in spruce; however, there was a greater proportion of holes in the upper samples in ponderosa pine than in spruce. The number of entrance holes in spruce, in the upper half, was roughly 1.5 times that of the lower half. In ponderosa pine the factor was 2.5 to 3 times that in the lower samples.

In attempting evaluations of damage to fire-killed trees by Monochamus the following tentative conclusions should be considered.

1. The number of Monochamus attacks is dependent on the time of the fire, and on the time of death of the tree which may not be at the time of the fire.
2. In the case of spruce, very hot fires may render trees unsuitable for attack by Monochamus. Apparently this does not hold with the pines.
3. The average depth of maximum penetration does not vary with burn types.
4. Depth of penetration by Monochamus varies between host species and possibly between spp. of Monochamus.
5. The rate of larval development and time of tunnel construction appears to differ between sawyer beetle species.
6. The greater damage occurs in the upper half of the tree in most instances.

Ambrosia Beetles

J. M. Kinghorn (Presented by R. R. Lejeune)

Relatively few woodboring insect species damage the coastal softwoods of British Columbia. With the huge volumes of waste wood still left on the ground after typical coastal logging, it is always a source of wonder why insects like Monochamus do not breed in huge numbers. It is true that many species of cerambycids, buprestids and siricids are native to the region, but cases of extensive damage are rare. Occasionally these groups heavily infest and damage fire-killed timber, but the losses in the course of normal logging are insignificant. Even after the hemlock looper catastrophe in the forties, woodborer damage was slight - actually horntails were the most common, and even their damage was restricted to the outer sapwood. Volume losses caused by sap- and heart-rots far outweighed the combined damage of all wood infesting insects.

In contrast with the other groups of woodborers, ambrosia beetles present a very real and costly problem to the coastal industry. To be more specific, it is the striped ambrosia beetle, Trypodendron lineatum, that breeds so prolifically in our felled timber. Other ambrosia beetles are of relatively little consequence, although Gnathotrichus sulcatus and G. retusus attacks usually occur with those of Trypodendron. Gnathotrichus has been more frequently the culprit in cases of beetles attacking freshly sawn lumber. Damage by Platypus wilsoni and Xyleborus tsugae is so rare that it does not warrant special consideration.

British Columbia lumber producers are so dependent on export markets that factors lowering lumber quality are of prime concern. Some segments of the industry have endeavoured to reduce ambrosia beetle damage, and concomitant with these efforts there have been demands for information on dollar losses caused by ambrosia beetles. Obviously, the cost of preventive measures must be less than the value of degrade losses prevented. Individual companies have conducted their own mill studies, and the Forest Biology and Forest Products Laboratories have cooperated on two occasions to ascertain ambrosia degrade to sawlogs. Lumber degrade is the principal source of value loss. Indirect losses through heavier slabbing and increased milling time do occur, but are extremely difficult to evaluate. Beetle damage in plywood peeler logs cannot be considered a real problem at the present time because of a surfeit of face veneer stock. An interesting sidelight is that Japanese mahogany face veneers have significantly invaded the Douglas fir veneer market. No one worries about ambrosia beetles in pulpwood; this type of damage does not affect the quality of pulp produced.

The following comments are gleaned from the 1957 mill study of sawlogs that had been infested in the forest. Seventy-three Douglas fir logs and 47 western hemlock logs were examined. Ninety-nine percent of the attacks were by Trypodendron. Attack densities averaged 26.6 holes per square foot in the fir logs, and 16.0 per square foot in the hemlock. Although most holes were no deeper than 1.5 inches, 50 to 74 percent of

the number of boards sawn from the logs were degraded because of beetle holes; from 33 to 61 percent of the volume sawn was affected. In logs of comparable size and quality, the logs with the higher proportion of sapwood to heartwood were those that suffered that greater value loss.

Value lost through degrade was governed strongly by the grading rules used. Grading rules for overseas markets treat ambrosia damage more severely than rules for lumber sold in North America. For example, the value lost from this group of logs due to ambrosia holes averaged \$5.25 per M fbm if the lumber was sold to North American buyers, but overseas grading rules dictated an average loss of \$7.80 per M fbm. Two factors governed the extent of value loss. Density of attack was one although it was not as important as the inherent value of the wood in the log. Logs yielding a high proportion of clear lumber grades were severely devalued, even when attacks were light. On the other hand, even severe infestation of logs normally yielding low quality lumber caused but little change in value.

Unfortunately the inherent value of logs cannot be estimated with any degree of accuracy before they are sawn. Hence it is not possible to predict with exactness the loss that may occur with varying degrees of attack. The general principle holds, however, and in practice first priority for protection can be given logs of obviously high quality. Large hemlock logs without knots or other defects showing on the surface will be seriously devalued by light attacks. Small, knotty hemlock is the obvious material to leave in the woods for the beetles, if any must be left at all.

The high incidence of ambrosia beetle damage stems from our logging methods. Mills are exacting machines that demand a steady flow of raw material for efficient operation. To ensure a constant supply of logs to the mills, the logging managers must maintain a certain reserve of material either felled, or in water storage, to allow for inevitable shut-downs due to snow, fire weather, and strikes. In the days of hand felling, large skidders, and railroads, the felled and logged timber reserve often equalled a year's production. Power saws, portable steel spars, and trucks have changed this situation, but on the other side of the ledger the new methods leave logs for the beetles along hundreds of miles of development roads and on snow-clogged high elevation settings where railroads never reached. Furthermore, logs in water storage are still susceptible to attack and damage. One company's mill study of logs infested only while in water storage shows that attack on just that portion of the log floating above water is sufficient to cause significant degrade losses. Losses as high as \$5.00 per M fbm were recorded.

The principal recommendation for lessening ambrosia beetle damage still calls for the reduction of log reserves to a minimum. The impact of such a policy on logging methods has been pronounced in some cases. In some places logging is actually started on settings before felling has been finished. In some companies, the logging managers must submit monthly inventories of log volumes in reserve, with good reasons for an excessive supply. We would be fooling ourselves to assume that the advent of "hot logging" has been prompted solely by the ambrosia problem.

Companies have realized that "hot logging" is good business, because every log held in reserve represents idle dollars that could be invested elsewhere.

For reasons already mentioned, the low log inventory method of reducing beetle damage has a very practical limit. Part of the reserves that must be held - and they are considerable - are susceptible to beetle damage. Methods of direct protection have been developed, although much more needs to be done. Of the material held in reserve, high quality logs from winter felled trees are those most susceptible to Trypodendron damage.

If these logs are in water storage they can be protected with a 0.4 percent BHC emulsion for about 17¢ per thousand. In the last two years experimental work has shown that helicopters can be used to treat log booms with the same economy as hand spraying, but it is a much faster and efficient method of treating the material. An oil concentrate containing one pound of the gamma isomer of BHC per Imperial gallon is applied at the rate of ten gallons per acre of raft surface. Since the logs must be treated just before attacks commence in spring, the time available for spraying is very limited - particularly when unsettled weather prevails. Hand spraying has always been limited because of the time and labour elements. With the helicopter spraying method it should be practical to protect most logs in water storage. A study by the Department of Fisheries last spring indicated that logs can be sprayed on lakes without undue harm to fish, although they still require that no spraying be done after April 15th, or on shallow water, or at the estuaries of creeks and rivers bearing surface-feeding and migrant fry.

The same degree of optimism cannot be expressed for protecting logs in the forests. Hand spraying is only practical where high quality logs are lying along accessible roads. Helicopter spraying has not proven effective, because with spray released from as low as 20 feet above ground, spray failed to reach the susceptible undersides of the logs.

There is no reason to believe that the ambrosia beetle populations will decline to acceptable lows in the foreseeable future. The importance attached to the damage will fluctuate with current market restrictions on damaged lumber - restrictions which will, if anything, increase with time. In the meantime the damage costs the industry from one to four million dollars annually in degrade losses and marketing problems. More can, and should be done to reduce reserve log inventories, and preventive methods must be developed to the practical level, but it is our hope that research now in progress will eventually lead to more acceptable means of preventing damage.

Questioning and discussion followed the presentations by the panalists:

- N. Johnson stated that the date of attack by ambrosia beetles varies with species; Trypodendron is first, Gnathotrichus is second and Platypus is last.

- K. Graham mentioned the problem of conducting mill studies without disrupting mill procedures. A mill man named Gordon Brand has devised a hypothetical sawing pattern for different diameter logs by which an 18 percent dollar loss was determined for infested 20" number 2 fir logs. The time loss due to infested logs versus clean logs was investigated during a 1950 study.
- R. Lejeune said that J. Kinghorn used a pony mill and there was no problem of the order of logs sawed. The mill was used solely for the study. However, the work was rough and the men were bruised.
- R. Stevens mentioned a possible problem of Gnathotrichus in second growth redwood sapwood.
- W. Wagener gave the viewpoint of a pathologist. In the woods, insects and disease work together. Studies should include both agents. Deterioration is the most neglected field in forest entomology, especially during the first year. Many factors enter into what happens on an individual burn, including elevation, time of fire, and age of trees. Stain associated with borers is another problem. We aren't even sure how it enters the tree. Also, recovery from fire is tied in with bark beetles and borers. We need studies of the whole picture, i.e., the vertical picture, not just what can be gleaned by chopping in at the base.
- R. Hall indicated that flatheaded borers have not been mentioned as a problem by the panel but they begin coming in while the smoke is in the air. More information is needed concerning them.
- D. Ross said that flatheaded borers were numerous but penetrated to only 3/4". Also, many species were present and difficult to identify as larvae.
- R. Hall pointed out a geographic difference in California in that the flatheaded borers penetrated much deeper, as great as 3 to 4 inches.
- M. Furniss concluded with a statement that such geographic differences can be very important and may be tied in with climate. According to J. J. Mielke, 84 percent of beetle-killed Engelmann spruce at 10,000 feet in southern Utah remained standing for 25 years. Yet, pine killed by bark beetles in Mexico was reported by J. M. Miller to have fallen and decomposed in a year's time.

IV. ECOLOGICAL EFFECTS OF INSECT ATTACKS IN
FOREST STANDS. EFFECTS ON AGE DISTRIBUTION, SPECIES COMPOSITION,
FOREST SUCCESSION, MANAGEMENT PLANS, SILVICULTURAL METHODS, ETC.

March 2, 1:00 - 4:30 p.m.

Moderator: D. W. Muelder
 Panalists: C. B. Eaton
 G. R. Hopping
 W. F. McCambridge
 J. P. Vite
 K. Graham

To streamline the procedure somewhat the panelists had been asked to discuss, if this fitted their own intention, for a forest type of their choice, the following questions:

1. For the type in general or certain subtypes what role do insects play either in maintaining this type or causing type changes? This applies to virgin forests and the insect condition found therein.
2. What insect conditions and problems were created by early logging?
3. How would the entomologist cut old growth if he had complete managerial control? How would he modify the virgin structure and species composition? (Sanitation salvage, rotation, silvicultural system, heaviness of cut, setting of blocks in clear cut systems, etc.)
4. How do insect conditions prevalent or to be expected in second-growth stands compare with virgin forest? (of the particular type under discussion).
5. How does age structure and species mixture affect hazard and outlook for control? (If points not sufficiently covered in 1 through 4).

These were the panelists and the topics they had chosen:

C.B. Eaton, Chief, Div. of Forest Insect Res. of the Pac. Southw. For. & R. Exp. Sta.: Outbreaks of the lodgepole pine needle miner (Evagora, or Recurvaria milleri) in Yosemite National Park.

G.R. Hopping, Research Entomologist, Forest Biology Div. Calgary, Dept. of For., Alberta, Canada: Ecological considerations and insects outbreaks.

W.F. McCambridge, Entomologist, Forest Insect and Disease Lab., Fort Collins, Colorado, Rocky Mt. For. & R. Exp. Sta.; The Engelmann spruce beetle in Colorado.

G.P. Vite, Boyce Thompson Institute for Plant Research Inc., BTI Forest Res. Lab. at Grass Valley, California: Host-insect relationship between ponderosa pine second-growth and the bark beetle population.

K. Graham, Prof. of Forest Entom., University of British Columbia, Vancouver, Canada: Ecological effects of Sitka spruce weevil.

The moderator expressed satisfaction that a silviculturist had been invited for this panel. Forest entomology is of such importance to many disciplines of forestry science that it has to be given its appropriate place in the educational program of forestry schools. To the discipline Silviculture, which is concerned with the biological and technical aspects of any conceivable means of tending forest stands to meet human objectives, it is of particular importance. Wherever insects have the

_ potential to interfere with the accomplishment of said objectives. pertinent entomological knowledge is basic to Silviculture.

When we compare forestry to agriculture, 5 differences which are of major importance to forest entomology, too, become apparent:

- a.) Forestry works with a tremendous accumulation of vulnerable plant substance.
- b.) Direct control of many of the major forest insects encounters, for biological reasons, particular difficulties. The extent of the areas to be treated and their limited accessibility makes the problem even more serious.
- c.) Economic limitations hamper measures of forest insect control much more severely.
- d.) The fact that there is mostly little relationship between the investment and the profit of the now operating generation is a continuous temptation to deviate from the principles of sustained yield forestry.

To these four grave circumstances a very fortunate one can be added, namely:

- e.) The way forest stands grow naturally is incomparably closer to how we tend them in forestry than is the case in agriculture, which just has to be extremely artificial.

The silviculturist thus must (see a-d) and can (see e) strive for a much higher degree of integrated, or "biological" in its broadest meaning, insect control than one can possibly accomplish in agriculture. It is in this endeavor that he considers the entomologist who understands forestry his closest ally. Joining forces we will succeed in overcoming misleading formulations such as "forestry is 50 years behind agriculture". The silviculturists, in turn, who understands entomology is fully aware of the fact that "build-in safety" is just one of several means. It is never perfect, often of no use at all. For some of the most destructive enemies direct control by spraying is indispensable.

C. B. Eaton could base his discussion on extensive research by his division, particularly by G. R. Struble. He chose the outbreaks of the needle miner (Evagora milleri) on Pinus contortus in Yosemite National Park, Tuolumne County, because the conditions are in no way disturbed by attempts to manage this type which covers the high elevations between 8,000 and 10,000 feet. Mixed species are Abies magnifica and Pinus monticola. The insect has long been an integral part of this type.

Since 1960 four epidemics have occurred, each of them followed by a mass attack of the mountain pine beetle, Dendroctonus monticola. More than 60,000 acres, highly prized for their recreation value, have been destroyed by the present outbreak, which started in 1954 and was for several years

called the most extensive single insect outbreak in the State. All age classes beyond the sapling stage are susceptible. In young stands heavy reduction of terminal growth is most conspicuous, and a scattered individual kill, which can well be beneficial to the mostly over-dense stands. In the mature and over-mature age classes more top kill and heavy growth reduction occurs followed by a die-off of trees and groups. The picture is complicated by the rapidly developing infestation of the mountain pine beetle in weakened trees. It is mainly the combination of the two insects (which occur separated in other areas), which eventually results in the killing of large stands.

Rather than a "destruction", the speaker labeled the impact of the insects on the type of "harvesting" proposition. The presence of young and old stands of lodgepole pine in the absence of any observable dynamics towards a species change is a general proof. As a special proof the reproduction underneath the snags of the 1910 epidemic was mentioned. We thus deal with a "needle miner subclimax type" whose dynamics fit part needs fairly well.

Now that DDT has been replaced by Malathion, aerial spraying looks very promising. So far it has been aimed at the adult and larval stage; however, the egg stage may be vulnerable also. The implications of insect control work in parks are too well known to the group to need explanation. Park Forester, R. H. Sharp explained the compromise which the Park administration has chosen, namely to allow the epidemic to take in general its course, but to save the most valuable camp sites by aerial spraying. This was done in close cooperation with the U.S. Forest Service on about 6 percent of the infested park area.

As potentially dangerous enemies for second growth management the lodgepole terminal weevil (Pissodes terminalis) and saw flies (Neodiprion sp.) were mentioned.

G. R. Hopping followed the line of thought for which he, with his specialty, Bio-systematics, is pioneering. Regarding the old controversy on whether insect hazards have increased, the speaker takes as a proof of this that the white man encountered "vast stretches of virgin forests practically untouched by any destructive agent". "Prior to 1900 there were considerable areas with beautiful stands of ponderosa pine 300 to 400 years old. Then in the space of 30 years these stands were destroyed by the western pine beetle and the mountain pine beetle. Following on the heels of this was a tremendous upsurge in the mountain pine beetle outbreak in the lodgepole pine stands in the interior plateau country."

Discussing the ecological reasons for the lower hazard under natural conditions, assumed by the speaker, D. Pimentel was quoted: "Diversity of species and complexity of association are considered vital to the stability and balance of systems." Insects such as Pissodes strobi, Choristoneura fumiferana, and Ips sp. were used as examples and comparisons drawn between virgin and managed conditions in different areas of the world.

What are the principles involved? Though doubtless in favor of Pimentel's philosophy, the speaker conceded that "most of the foregoing is observational" and that more has to be done to get experimental evidence. The speaker's way to deal with the short-sighted objection that this or that is not "economically feasible" deserves to be quoted: "..... There is no way of knowing what may be economically feasible until we know what will work towards that alleviation of insect outbreaks. Very few prototypes of pilot plants were ever completed which made a profit by themselves, but the principles learned in the process may be extremely valuable in the modification of silvicultural practice in commercial operations which may materially lessen the chances of insect outbreaks.

To the particular topic of the panel the speaker contributed the following example: In Alberta the so-called climax spruce-alpine fire stands sometimes develop according to the following pattern: After fires nearly pure stands of lodgepole pine develop. Later spruce and, at higher elevations, alpine fir from nearby seed sources form an understory. After 100 years later the spruce begins to overtop the pine, and again 100 years later the pine starts dropping out. Alpine fir regeneration increases greatly and after again 100 years the stand is composed of a mixed overstory of spruce (predominating) and alpine fir and an understory of alpine fir (predominating) and spruce. This dynamic may be speeded up by the mountain pine beetle as was the case in its outbreak in 1930 - 1942 in the Kootenay Park. Here the lodgepole pine overstory was killed at an early stage of the spruce-fire invasion, shortening by about 100 years the cycle outlined before.

W. F. McCambridge covered the proposed guidelines thoroughly. Engelmann spruce, mostly associated with subalpine fir or lodgepole pine, (in creek bottoms at about 8,000 feet with Douglas fir and Colorado blue spruce), occupies 3.2 million acres of commercial forest in the high country of Colorado. The mixture, spruce - alpine fir, is considered near-climax; however, many stands do not conform to this in their age structure. The speaker thinks that this is due to outbreaks of the Engelmann spruce beetle rather than to fires as believed by others. (His opinion fits F.P. Keen's statement, 1952: "During epidemics trees of all ages and diameters, except reproduction, are attacked" by Dendroctonus Engelmanni). Thus the moding effect of endemic infestations which tends to make an uneven-aged forest is superseded by beetle outbreaks which produce extensive even-aged stands of spruce-fir. When the spruce deteriorates the associated subalpine fir is subjected to windthrow, snow breakage and increased decay.

The 1941-1954 outbreak practically killed every spruce and lodgepole pine over an area of several hundred thousand acres. The pattern observed at Tappers Lake is typical:

1941 - 1945	8% of the spruce killed, average d.b.h. 20"
1946	8% of the spruce killed, average d.b.h. 19"
1947	80% of the spruce killed, average d.b.h. 10"
1941 - 1947	69% of the lodgepole pine over 5" killed

Only 4% of the spruce larger than 3" and 31% of the pine over 5" remained. With findings by E. M. Hornibrook in the White River National Forest the speaker exemplified that the destruction does not result in any type change. Stand conditions after the outbreak were as follows: The overstory consisted of 47 subalpine fir 8" d.b.h. and larger and 13 spruce from 8" to 12" d.b.h. The understory (seedlings and small trees) consisted of 481 spruce and 619 subalpine fir. The further development of such stands seems to be fairly well predictable on the basis that spruce may have about 150-200 trouble-free years ahead of it. Different age classes of subalpine fir will be killed singly or in small groups by the balsam bark beetle (*Dryocoetes confusus*). From time to time the spruce budworm will take its toll from the subalpine fir and, much less severely, from the spruce. The adverse effect of the two insects is partly offset by the release which works in favor of the more desired spruce.

Against this background of natural development, cutting operations were discussed. The most serious problem is the build-up of the spruce beetle in blowdown material; control of the latter therefore is essential. Several cutting methods were discussed, called (a) "alternate clear-strips", (b) "group selection", and (c) "single tree selection", each of them calling for the removal of about 50 to 60% of the original stand. (a) caused the highest, and (b) the lowest windfall. In (c) the spruce beetle attacked the leave strips heavily. The speaker recommends application of (b) and a size of about 20 to 40 acres for the clearcut patches. Further recommendations concerned details of logging, also aimed at keeping potential breeding material at a minimum.

J. P. Vite stressed the following three points:

(1.) Population dynamics of bark beetles depend on the availability of suitable breeding material. A stand of second-growth ponderosa pine at Lake Tahoe, Nevada, having epidemic conditions, and a similar stand at Grass Valley, having endemic conditions, compare as follows: 30-60% susceptible trees at Lake Tahoe, versus 10% at Grass Valley. "Susceptibility" follows turgidity which is measured in oleo-resin pressure. Under extreme drought conditions, as in 1960, the percentage at Grass Valley reached 70 also; however, the small beetle population could not build up fast enough to reach epidemic dimensions.

(2.) Bark beetle infestations influence both, stand density and species composition, and the "constitution" of the stand in turn influences the bark beetle population. Bark beetle infestations in ponderosa pine often occur in a group pattern. The trend for concentration necessary for beetle survival in pine stands having but few susceptible trees (because bark beetles cannot survive on single trees, even of low turgidity) is reversed after an outbreak. Concentration causes overcrowding in limited localities and leads to attack of unsuitable material although low turgid trees may be available in the vicinity.

(3.) The crowns of the trees which are neighboring beetle killed members of the stand may come, by the sudden exposure, under heavier stress, thus declining in turgidity. This together with the impact of mass

attack over short distances turns previously "resistant" trees into susceptible ones.

K. Graham reported on interesting studies on the Sitka spruce weevil (Pissodes sitchensis), called by F. P. Keen "the insect most injurious to Sitka spruce reproduction in the Pacific Northwest." Those familiar with the eastern white pine weevil can draw many parallels. There as here the ecological consequences derive from the insects manner of attack, the growth response of the tree, the persistence of the infestations, and the competition from other tree species. The extent of the effects differs with locality, perhaps influenced by rainfall, temperature, and soil.

When a Sitka spruce is attacked, it loses the axial growth of the previous season, and the potential axial growth of the current season. If the injury occurs before new shoot development for the season, the new shoots from the top whorl of branches grow vertically and form multiple leaders; the tree thus, in the same season, regains some of the height lost by death of the terminal bud. If the injury occurs after new shoot development, the lateral shoots have already continued horizontally, and the tree has lost two years' axial increment in one season; it has also established a greater displacement and deformity in the future axis. If no further attacks take place, about 65-75% of trees recover single leadership in 2-3 years. But infestations persist, and trees are repeatedly attacked. If the downward feeding of larvae in the phloem extends into the node from which the upper whorl of branches arises, the branches may be too weak to develop leaders, but retain their suppressive effect over leader development in the next whorl down. The tree is then in danger of suppression.

The long term effect is drastic suppression of height development, and spreading form. Spruce becomes overtopped by competing species and loses its dominance. A spruce canopy fails to form, and brush species remain as a major feature of the stand structure. The proportion of spruce in the association is reduced by early deaths from suppression. In some situations the surviving trees develop as great spreading shrubs that resist encroachment. They are then no better than forest weeds occupying forest land for decades, and delaying normal forest establishment.

The broader consequence of the weevil is that it frustrates the development of Sitka spruce plantations and restricts the ability of natural regeneration to compete with alder in clear cut areas of river deltas. One might suspect that mature Sitka spruce would have been a more abundant stand constituent in certain areas had it not been for this weevil during past centuries. With some evidence at hand, that certain individual trees may be immune to the weevil, it is remarkable that natural selection has not resulted in a higher percentage of resistant trees. Planting stock from seed obtained from highly productive Sitka spruce areas shows no special immunity when planted in "weevil areas". The ecological outcome must therefore be regulated by local influences.

Moderator's comments:

Unfortunately there was neither enough time to take down the wording of the questions and answers (indeed to do justice to both, the speakers and the questioners) nor to carry the discussion far enough so that agreements and disagreements could crystalize. Many questions, very much to the point, made in the presentations, were asked amount others by G. R. Struble, J. Bongberg and R. Smith. To save the discussion for the record, the moderator will try to deal as a silviculturist with some of those points which seem to be of major importance from the viewpoint of both, the general topic and the questions asked.

As far as the outbreaks of the lodgepole pine needle miner are concerned, no experience is available on whether and how some silvicultural control could be integrated. Many stands are over-dense and/or over-mature. Because all age classes are attacked by the insect, only slight improvements, if any, can be expected from either changing the uniformity in favor of much smaller, though still even-aged, stands or by converting the even-aged to an uneven-aged structure. Thinnings, too, if they were economically feasible might not change the food condition for the needle miner. However, there is a reasonable chance that silvicultural means of the types mentioned here might change substantially the food condition for the mountain pine beetle. This for itself could be a good step ahead. If, in addition, the needle miner is checked by spraying and the weakening of the tree thus reduced, one might succeed in breaking the pernicious combination of the two insects.

To deal more effectively with the extremely complex problem of what purpose diversification can serve, a breakdown of the following type may be helpful:

1. There can be no doubt that epidemic outbreaks of forest-destroying insects are a most natural thing. The point, however, can be made that this is particularly the case where diversification is lacking in nature. The homogeneity which results from outbreaks may deserve our interest also as a possible cause of their recurrence.
2. As far as the outbreaks are closely related to overstocking and overmaturity, silviculture of some reasonable intensity takes care of the main problems almost automatically.
3. Certain insects are so little dependent on a host condition of a type which one can possibly influence, that an effective silvicultural control can hardly be imagined. Here belong many needle feeders which just call for control by spraying.
4. Where mixtures are easy to accomplish and otherwise desirable or at least tolerable, they can have the advantage that the stands are not entirely destroyed by outbreaks of the insects

discussed under No. 3. This can serve important silvicultural and managerial purposes. Where the insects under discussion prefer certain age classes, uneven-aged structures are one more means to soften the impact. If such silvicultural means are available, it is very questionable whether one should, even where it has proven to be successful, entirely rely on spraying. One does not have to be a "naturalist" to advocate caution in spraying. Furthermore, there may very well be times of public emergency ahead where intensive care just cannot be applied so that any type of built-in safety may pay off.

5. Uneven-aged climax structures demonstrate that for centuries no insects have been able to destroy larger parts of these forests. We otherwise could not have the age distribution as we find it for instance in the mixed conifer type of the Sierra Nevada, in the red fir belt, and in the east side or interior pine type. We like to say that the uneven-aged structure of climax types is mainly due to the molding work of insects, which take individual trees and groups, however, it seems to be necessary to stress that the stability of these types is not due to the fact that dangerous insects are lacking, as one could state for instance for coastal redwood. These types have their climax structure in spite of the presence of most dangerous insects, particularly bark beetles. More recent evidence in second-growth justifies concern. These insects, which were not able to destroy stands having climax structures, may very well be able to destroy even-aged stands on a larger scale. A close study of how insects attack even-aged and uneven-aged stands of these types will give us more dependable answers in about 10 to 20 years.

6. Discussing the issue of mixed stands versus pure stands we must not overlook the possibility that naturally pure stands may result from the fact that the site conditions involved are working against outbreaks, thus allowing one species to dominate the site, whereas mixed stands may reflect the fact that pure stands cannot maintain themselves on the site. A certain number of the mixed type may seem to be just as much or even more susceptible than it is in naturally pure stands on other sites. The key issue, then, is how the species will perform in pure stands on a site which naturally tends towards mixed stands.

7. The strictly entomological part of the question of why a diversified community may be less vulnerable must be left to the entomologists. As far as host condition is important, mixed stands often constitute a mixture of suitable and unsuitable food, leaving the stand at least partly intact (see No. 4). Where the killing of trees adversely influences the physiological condition of their neighbors, making them more susceptible (a pattern which may very well be of considerable importance in California), mixtures will reduce the number of such cases in a

given stand. In uneven-aged stands there are, over short distances profound differences in host conditions which undeniable are of greatest importance to the pattern of bark beetle attack. In regulated uneven-aged stands this will be much more the case than in natural types with their often deplored preponderance of older trees.

It is most unfortunate that discussions of what purpose diversification can serve are so often carried out as if the issue were "natural" versus "artificial" or even "unnatural" silviculture. If diversification is a reasonable tool, we have many more means than nature has to accomplish it. Though the silviculturist is inclined to look and to work for as much integrated control as possible and to try to learn about this from nature, his thinking is not paralyzed by what is "natural". In many cases where the natural forces don't work towards diversification silvicultural treatments can do this very well. Many highly useful diversifications may well be highly "unnatural".

8. The burden of proof is with both, not only with those who are inclined to advocate diversification. Those who do not care or even favor removal of diversification have just as well to prove that this is not dangerous. By homogenizing diversified mixtures and structures and by not using opportunities to diversify homogeneous conditions we may very well give away highly valuable ecological advantages which, once lost, are very difficult to reestablish.

9. Discussions between entomologists and silviculturists will be facilitated if both comply with proper terminology. A look at the SAF Forest Terminology will, for instance, quickly reveal that a sudden cutting of 50-60% of the volume of a virgin type can neither be called "selection" nor "method", particularly not with a delicate species. The less diversification there is to begin with, the more delicate is spruce and less can such procedures be expected to work. Over extensive areas spruce-alpine fir does occur in a climax structure (see Forest Cover Types of North America Type 206), a proof that the selection system deserves further attention.

The difference between "group" and "single tree" selection is a matter of degree only. Both "silvicultural systems" (or "cutting methods") maintain, or accomplish first and then maintain uneven-aged structures, with all the well known ecological implications. Where cutting areas of several acres, or even of 20 to 40 acres, are under discussion, we are dealing with the ecology of completely open areas and of even-aged stands restocking them. "Clear cutting" also to be a "system" requires that it has proven to work on an operational scale, with everything under reasonable control: blow-down, insects, and reproduction.

No doubt, forest entomologists know all this very well. We use certain terms sometimes in a loose, sometimes in a strict sense. However, where ecological problems are involved there is no choice.

Here only the strictest use can work. Considering the fact that the recommended cutting practice in the Engelmann spruce-alpine fir type does not secure reproduction of spruce, our understanding each other might be facilitated if we concede that we are not dealing with silvicultural systems (or cutting methods) at all, but with entomological recommendations aimed at finding ways to liquidate this type without too serious losses.

10. Our discussion will furthermore be facilitated if we always clarify the levels of intensity involved. For example, the very "artificial" cultivation of spruce in Middle Europe outside its natural range seems to work well, however, the success depends entirely on a very high level of intensity, with careful hunting for each infested tree. Letdowns in intensity have led to catastrophic losses, and it is questionable whether even this high level suffices to control after-effects of drought years such as 1959.

V. METHODS AND TECHNIQUES SECTION OF THE 1961 WESTERN FOREST INSECT WORK CONFERENCE

March 3, 9:00 - 12:00

Moderator: N. E. Johnson

A methods and techniques section was added to the 12th annual Western Forest Insect Work Conference. Participation in this part of the program was excellent and from the comments received, it turned out to be very well received by the members of the conference. Following is a list of the contributors:

Dr. J. P. Vite	Methods for studying oleoresin pressures in pines and its relationship to bark beetle attack.
Alan Berryman	Use of X-ray in Forest Entomology.
W. D. Bedard	A rearing method for bark beetles.
W. C. Guy	Some suggestions for better insect pictures.
Dr. R. G. Mitchell	A portable field microscope; a microslide projector for making drawings of insects.
V. Carolin	European pine shoot moth fumigation apparatus.

Dr. G. T. Silver	A method for rearing forest defoliators
Dr. L. H. McMullen	(presented various techniques for trapping bark beetles, making artificial infestations).
R. L. Lyon	Precision spray chamber. Methods used in
R. H. Smith	studying the toxicity of resins to bark beetles.
B. E. Wickman	A method of preventing checking in tree sections.
T. W. Koerber	A laboratory set-up for taking close-up photographs of insects.
Dr. R. C. Hall	An inexpensive dendrometer.
Dr. R. W. Reid	A method for studying the behavior of the mountain pine beetle.
G. R. Hopping	A rearing method for Ips.
Dr. K. Graham	Methods used in studying attractants to ambrosia beetles.
Gary Pitmann	Device to produce fluctuating temperatures in temperature cabinet.
Roger Ryan	A bark thickness-area gauge used in studies of the parasite <u>Coeloides brunneri</u> .
R. I. Washburn	A new method for sealing sleeve cages. Use of fluorescent dyes and their detection in spray studies.
M. M. Furniss	A bark punch for taking precise samples for Douglas-fir beetle studies.
G. Trostle	Land-clearing methods for site preparation in the spruce stands devastated by Englemann spruce beetle.
D. Hester	Use of beetle trap trees.
Dan Dotta	Posters to interest the public in bark beetles.
C. S. Schaefer	Instrumentation for recording temperatures in Monterey pine cones.

D. G. Allen	Inexpensive time switch for operating light traps.
Dr. J. A. Chapman	Photographic display of several techniques.
A. F. Hedlin	X-rays of insect infested seed.
T. Terrèll	A method for preserving foliage for subsequent sampling.

MINUTES OF THE FINAL BUSINESS MEETING

March 3, 1961

The Chairman called the meeting to order at 1:05 p.m.

The minutes of the initial business meeting were read. Norman Johnson requested that Mr. Pittman's first name be corrected to read Gerry Pittman. Correction was made. Mr. Lejeune moved that the minutes be approved. Seconded by Norman Johnson. Carried.

The Chairman outlined the reasons for selection of Phoenix, Arizona, for the 1962 meeting. They were as follows: (1) the new Western Forest Biology Laboratory at Corvallis will not be complete by 1962 and (2) the new laboratory at Victoria, B.C., will not be ready until 1964.

Bill McCambridge asked who would be host. Chairman Wilford replied that the Rocky Mountain Forest and Range Experiment Station would be host with Cal Massey as Program Chairman. A lively discussion followed. There were several objections to Phoenix and many questions as to why Phoenix was selected. Mr. Lejeune felt that participation would vary directly with distance traveled.

Stark pointed out that attendance and participation in the meeting would be governed more by content of the program than by travel distance to the meeting.

Stark moved that Phoenix be selected for the 1962 meeting. Seconded by Ken Graham. Carried.

The Conference was in agreement that the 1963 meeting be in Corvallis, Oregon, and that Victoria, British Columbia, be considered for the 1964 meeting.

The Chairman outlined the theme of the 1962 meeting. "Insects Affecting Regeneration" is to be the theme for the first two days, followed by a seminar on the last day. The panel of the seminar to be made up of young research people presenting the work they are doing. This seminar need not follow the theme.

Dick Washburn asked for a more detailed definition of the theme. Dr. Stark explained that the theme would encompass all insects that affect the establishment of a forest stand (seed and cone insects, tip weevils, root weevils, tip moths, and defoliators).

Walt Cole felt that the program would be rather limited and asked Dr. Stark who would be prospective panel members. Ron Stark stated that the University of California and the Pacific Southwest Forest and Range Experiment Station could contribute two, Weyerhaeuser Company one, Oregon State University one, Vancouver one or two, and Calgary one or two.

George Hopping asked if the theme applied to nursery insects. Stark replied that it did.

D. Eaton moved that the proposed theme be accepted. Seconded by George Struble.

Roy Shepherd felt that the theme was an excellent selection. He brought up two ideas of other themes that he felt the Conference should consider for future meetings: (1) devote one meeting to a program review as to what the research people are doing and (2) devote one program entirely to surveys.

Val Carolin asked for the question. Original motion carried (58 in favor and 5 opposed).

D. Stark suggested that Dr. Massey be given authority to select the program for the 1962 meeting.

Ken Wright offered another suggestion of a theme for a meeting. He relayed Bill Coulter's idea that the Conference devote one meeting to methodology.

The Chairman asked for a discussion as to whether or not the Conference should purchase 300 reprints of the Education Committee's report for distribution to membership and to colleges and universities.

Bill McCambridge asked if the distribution to colleges meant only those having a forest entomology curricula.

D. Stark stated that he felt copies should go to all colleges granting forestry degrees.

Phil Johnson stated that he didn't feel we should distribute reprints to all the members as most members probably get the Journal of Forestry. Phil did endorse the suggestion that universities receive copies of the report.

Jack Bonberg asked Ron Stark how many copies he would get as senior author. D. Stark replied that the senior author gets only a small number of reprints. He stated that it is the policy of the University of California to purchase 200 copies. He stated further, the 300 copies the Conference purchases could be used to supplement the 200 purchased by the university. D. Stark pointed out that the impact would be greater if we sent all universities a copy of the report under a cover letter.

Ralph Hall stated that the Conference should purchase 300 copies of the reprint to fulfill their obligation to the Education Committee; D. Hall so moved. Seconded by Phil Johnson. Carried (one opposed).

D. Stark moved that the listing of current research projects be included in this year's proceedings, and that the names of personnel doing the work be listed after each project. Seconded by Ray Lejeune. Carried.

Roy Shepherd accepted the appointment as Chairman of the Committee of Indexing of Unpublished Reports.

D. Eaton stated that he had doubts in his mind as to the value of the insect conditions report. He stated that there are several reports all similar to the one compiled by the Conference. He felt we should eliminate putting it out as a bound copy.

Dick Washburn reported that the original objective of the report was to furnish a source of information to the person who presents the insect conditions at each meeting. Dick agreed with D. Eaton.

Ken Wright suggested that the regions prepare the material in the same form as they have in the past but submit only two copies to the person summarizing the insect conditions

C. J. DeMars stated that had he received a one-page statement of insect conditions from each region, it would have been easier for him so summarize the insect conditions of Western North America.

Jack Bonberg moved that the Conference eliminate processing and distribution of the insect conditions report. Seconded by D. Eaton. Carried.

D. Stark outlined his ideas on the publishing of a bimonthly newsletter. He stated that he did not wish for the Conference to sponsor the letter as their own house organ. He volunteered to put the letter out on a trial basis. It would be patterned after the Canadian bimonthly report. The objective of the letter would be to report results of research immediately but it would not lessen the status of a publication.

D. Dave Wood asked if the bimonthly news notes would be restricted to the field of forest entomology in the Western United States. Would Canadian entomologists use the letter? Dave felt that we now have several entomological journals in which we could publish research findings.

Boyd Wickman stated that the Divisions of Forest Insect Research at the Forest and Range Experiment Station put out a quarterly report which covers progress of research studies.

Jack Bonberg stated that there is a need for a release of certain research information. The United States Department of Agriculture (USDA) has considered putting out a journal devoted entirely to forest pest problems. To put out a journal with a mailing list of 2,000 would cost \$15,000 yearly. Material to be included would be centered around research, surveys and control.

Jack reports the Journal of Forestry claims to be short of forest insect articles.

Ralph Hall asked what happened to the Forest Worker. Bonberg replied that the journal died because of the lack of interest.

D. Dave Wood felt that note-type reports were not desirable as they tend to get too big.

Norman Johnson asked for an opinion from the Canadians on what they felt the value of their bimonthly newsletter was to them.

Dr. McGugan replied that the original intent of the report was to provide, in a brief way, highlights of research work to the general public. The letter gradually changed to a media for circulating results of research progress between the research people. People outside of forest insect research have contributed information to the letter. These contributors have all been Canadians; however, there are no restrictions against outsiders contributing information.

D. Stark pointed out that the Canadian bimonthly report was quickly accepted.

D. Eaton moved the proposal be tabled. Seconded by Jack Bonberg. Carried (one opposed).

Report of Committees:

D. Charles Eaton, Chairman of Nominating Committee, reported that his Committee recommended Norman Johnson of Weyerhaeuser Company as the new Council member of the Executive Committee.

The Chairman asked for other nominations from the floor.

Jack Bonberg moved that nominations be closed. Seconded by Ken Wright. Carried. Norman Johnson elected by acclamation.

Phil Johnson, Chairman of Common Names Committee, reported his Committee met Wednesday night, March 1. Reviewed common names of insects that are to be submitted with recommendations for being accepted.

Phil encouraged Conference members to voice opinions on what common names of insects they would like to have accepted; urged members to study regulations concerning naming of insects.

Phil reported that forms are available for submitting common names of insects from all forest insect laboratories, Chairman of the Committee (Missoula Laboratory), and the Secretary-Treasurer (Region 2). Phil cautioned members to follow rules printed by Entomological Society of America.

D. Ron Stark, Chairman of Education Committee, reported his Committee met at noon, March 2. They discussed distribution of reprints. In near future, they plan to start contacting colleges and universities in the West regarding their entomology and pathology curriculum. Ron announced that Dr. Ed Sturgeon was appointed to the Education Committee.

Tom Koerber reported that a seed and cone insects meeting was held the evening of March 1. Those attending were persons interested in seed and cone insects. No proposals were drawn up.

Jack Bonberg, Chairman of the Ethical Practices Committee, reported that he and his fine staff have reviewed the new candidates for the chairmanship and that Russ Mitchell was selected for the chairmanship.

Chairman Wilford expressed for the group their appreciation for the excellent program and local arrangements provided for by Program Chairman, Ralph Hall; Co-Chairman, Ron Stark; and the Program Committees. Special thanks for the program provided for the wives of the attending members. A standing applause was given by Conference members to show their appreciation for the program.

I Eaton announced that the Pacific Branch of the Entomological Society of America will meet at Santa Barbara, California, June 20-22.

Meeting adjourned at 3:00 p.m.

LIST OF CURRENT RESEARCH PROJECTS

ALASKA FOREST RESEARCH CENTER

Systematic insect collections

- (1) To develop a list of insects associated with forest damage in Alaska. Downing.
- (2) To provide data on the biology of these insects. Downing.
- (3) To determine the yearly trends in individual forest insect populations. Downing.

Insects destructive of the flowers, seeds, and cones of trees - biology, ecology, and control

- (1) The effect of insects on white spruce seed production. (A study in cooperation with the Division of Forest Management Research) Downing.

Black-headed budworm in Alaska - biology and control

- (1) Development of the black-headed budworm in relation to elevation and aspect. Rose.
- (2) Development of the black-headed budworm in relation to weather factors. Rose.

DEPARTMENT OF FORESTRY LABORATORY OF FOREST ENTOMOLOGY AND PATHOLOGY BRITISH COLUMBIA

<u>Investigator(s)</u>	<u>Project Title</u> <u>Active Projects</u>
Kinghorn, J.M.	Control of the black-headed budworm.
Ross, D.A.	Investigations on (A) cone and wood-boring Lepidophera, (B) particularly <u>Dioryctria</u> spp.
Evans, David	A study of the ecology and associates of an oak-gall wasp, <u>Besbicus mirabilis</u> Kinsey.
McMullen, L.H. and M.D. Atkins	General studies of the Douglas-fir beetle, <u>Dendroctonus pseudotsugae</u> Hopk., in the interior of British Columbia.
McMullen, L.H.	Parasites and predators as natural control factors of the Douglas-fir beetle, <u>Dendroctonus pseudotsugae</u> Hopk., in the interior of British Columbia.
Atkins, M.D.	The effect of temperature, air moisture and light on the activity and behaviour of the Douglas-fir beetle and several other scolytids.

- Chapman, J.A. A study of the biology, physiology and behaviour of ambrosia beetles, particularly, Trypodendron lineatum.
- Dyer, E.D.A. Factors influencing the abundance and distribution of ambrosia beetles, particularly Trypodendron lineatum.
- Kinghorn, J.M. Control studies of ambrosia beetles.
- Hedlin, A.F. Insects affecting seed production in Douglas-fir.
- Smith, D.N. Infestation level of Anobiidae in relation to strength deterioration of structural timbers.
- Smith, D.N. The separation of larvae of species of Anobiidae infesting wood in service in British Columbia.
- Morris, O.N. A comparative study of the polyhedroses of the western oak looper, Lambdina somniaria, and the western hemlock looper, L. fiscellaria lugubrosa.
- Atkins, M.D. Studies on the primitive beetle Priacma serrata (Lec.), (Cupedidae: Coleoptera).
- Condrashoff, S.F. Bionomics of aspen leaf miner, Phyllocnistis populiella Chamb.
- Harris, J.W.E. A study of the poplar and willow borer Sternochetus lapathi L.
- Harris, J.W.E. Population sampling of the two-year cycle spruce budworm, Choristoneura fumiferana (Clem.)
- Wellington, W.G. Investigations in ecological meteorology with special reference to the ecology of forest insects: General studies.
- Edwards, D.K. Influences of atmospheric electricity and pressure on insect behavior and deveopment.

Completed Projects

- Evans, David Descriptions of Erannis vancouverensis Hulst, with life history notes (Lepidoptera: Geometridae).
- Condrashoff, S.F. Douglas-fir needle miners, Contarinia spp. (Diptera: Cecidomyiidae).
- Atkins, M.D. Flight physiology and behaviour of the Douglas-fir beetle, Dendroctonus pseudotsugae Hopk.
- Evans, D. The life history of Melanolophia imitata Walker, with descriptions of the stages (Lepidoptera: Geometridae).

DEPARTMENT OF FORESTRY
LABORATORY OF FOREST ENTOMOLOGY AND PATHOLOGY
ALBERTA

Forest insect survey

C. E. Brown

Objectives: 1. To make an annual appraisal of the status of destructive and potentially destructive forest insects.

2. To accumulate information on: (a) the species of insects inhabiting the forest; (b) the number and distribution of forest insects; (c) the interactions between host insects and their parasites, predators and diseases; (d) the hosts of forest insects; (e) the effects of different forest environments on different insect populations.

3. To participate in the research program of the laboratory by conducting research on problems indicated by survey activities either independently or in collaboration with the research staff.

Ecology, morphology, and taxonomy of forest Geometridae, with emphasis on immature stages.

W. C. McGuffin

Objectives: 1. A description and classification of the immature stages of the Canadian forest Geometridae. This will include: Life history studies and description of as many species as feasible; seasonal changes in the occurrence of geometrid species on various tree hosts; description of the behaviour of larvae and adults; attempts to find new and better ways of rearing Geometridae.

Bionomics and population sampling of the lodgepole needle miner.

R. F. Shepherd
(pro.tem.)

Objectives: Tabulating the generation epidemiology with the long-range objective of determining the causes of future population fluctuations.

The Biology of the pine root weevil, Hylobius warreni Wood, in Alberta and Western Canadian National Parks.

H. F. Gerezke

Objectives: 1. To provide a more complete picture of the distribution and abundance of H. warreni and related species in Alberta.

2. To complete the studies on the life cycle of H. warreni commenced by Reid and Stark for this region.

3. To observe the behavior of adult weevils under controlled environmental conditions in the laboratory.

4. To compare the relative sizes of populations of the weevil in clear-cut and pine regeneration stands with adjacent undisturbed or mature stands. This will involve: (a) the determination of the relative number of larvae, pupae, and adults that occur under a

variety of conditions in the field; (b) the determination of the relative numbers of weevils and their damage involved with mortality to pine of regeneration size; (c) the determination of possible changes of environments resulting from stand disturbances and the relating of these to the development and survival of this insect.

Bio-taxonomic studies of the Scolytidae.

G. R. Hopping

Objectives: 1. To establish the validity or synonymy of various species of bark beetles, chiefly in the genera *Ips* and *Dendroctonus* with the study of the *Ips* of North America taking priority.

2. To associate immature stages with parent stock and to supply such material to Dr. Thomas of the Sault Ste. Marie Laboratory for study, concomitant with studies of the adults.

Studies on the biology of the Engelmann spruce weevil, *Pissodes engelmanni*
Hopkins. R. E. Stevenson

Objectives: 1. To determine the life history of the insect.

2. To learn the identities and incidence of parasites and predators.

3. To learn the incidence of weevil attack under a variety of stand conditions.

4. To determine the distribution.

Mountain Pine Beetles Studies.

R. F. Shepherd
(Co-ordinator)

Studies on the biology of the mountain pine beetle, *Dendroctonus monticolae*
Hopk. R. W. Reid

Objectives: 1. To determine, each year, the period of flight, rate of brood development, and general life cycle of the mountain pine beetle in selected experimental areas.

2. To describe the interaction between the insects and the tree with special emphasis on the physiological condition of each. This work will begin with a study of the influence of bark moisture upon the initiation of the second flight and upon brood survival after establishment.

3. To study the relation between the productivity of established broods and tree characteristics in order to devise a system of detecting trees which will produce high numbers of beetles.

Population studies of the mountain pine beetle.

R. F. Shepherd

Objectives: 1. To describe the distribution of beetle attacks over the host and the factors that influence this distribution and also to determine the different mortality factors acting on the beetle and their variability within and between hosts.

2. To devise a sampling system based upon the findings of the first objective which would be suitable for population sampling.

Factors affecting the attraction and susceptibility of trees to the mountain pine beetle.

R. F. Shepherd and J. A. Cook

Objectives: 1. Develop techniques for measuring resin exudation and determining the relationship between amount of resin produced and success of beetle attack. Determine the tree characteristics which are associated with high and low resin production. This will involve determinations of the number and size of resin ducts, resin pressure and viscosity, growth rates and bark and crown characteristics. Determine the influence of environmental factors, particularly soil moisture upon resin production of the tree. Determine the distribution of resin ducts in relation to the depth and width of galleries, and the time of attack.

2. Determine the reason for congregation of beetles on certain trees. This will involve tests of tree characteristics such as diameter and bark, tests of the influence of successful and unsuccessful initial attacks upon the remaining population, tests of the influence of tree wounding, and tests of the influence smell and sound will have upon tree selection. Describe the behavior of flying adults as they respond to various environmental factors and how this may influence tree selection.

A study of climate in relation to the mountain pine beetle. J. M. Powell

Objectives: A study of the more important climatic factors affecting the mountain pine beetle in western Canada. The study of individual weather factors and the cumulative effect of these factors on the insect may provide a method of predictive forecasting for mountain pine beetle outbreaks. The microclimatic conditions in a number of mountain valleys and within the stand will also be investigated.

A study of the reproductive systems of the mountain pine beetle, Dendroctonus monticolae Hopk.

H. F. Cerezke

Objectives: 1. To describe the internal reproductive systems of male and female beetles and to show the morphological changes that occur during the normal life span of adult activity.

2. To study the copulation process to learn the characteristics of sperm transfer and storage, and the functional sequence of the bursa copulatrix, spermatheca and colleterial glands.

3. To describe egg formation from oocyte to deposition.

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

New No.

FS-2-e1-5-PNW

Line Project Title: Douglas-fir beetle, ecology and control.

K. H. Wright

Study Objectives: (a) To determine the reasons for periodic outbreaks in the Douglas-fir region, and (b) to determine the rate of deterioration of trees killed by the Douglas-fir beetle.

FS-2-e3-2-PNW

Line Project Title: Spruce budworm - biology, ecology, and natural control.

V. M. Carolin and W. K. Coulter

Study Objectives: To determine: (a) The distribution of populations on trees and within stands as a basis for extensive sampling, (b) the effects of natural control factors upon population trends, (c) infestation characteristics, such as differential occurrence of damage (d) effects of spraying upon the budworm, its parasites, and associated insects, (e) variations in life history and habits with different tree hosts and environmental conditions.

FS-2-e3-3-PNW

Line Project Title: Black-headed budworm - biology and control.

V. M. Carolin and W. K. Coulter

Study Objectives: To determine: (a) the distribution of populations on trees and within stands as a basis for extensive sampling; (b) the effects and relative importance of major natural control factors, such as insect parasites and disease; (c) quantitative aspects of the life history capacity; (d) the relation between populations and subsequent defoliation and damage.

FS-2-e4-6-PNW

Line Project Title: Chermes, a forest insect pest, its biology, ecology and control.

K. H. Wright, R. G. Mitchell, and Paul E. Buffam

Study Objectives: (a) to determine the biology and seasonal history of the insect on its principal host trees in Oregon

and Washington, (b) to catalog the native insect predators of chermes and assess their effectiveness, (c) to import and colonize available foreign predators, and (d) to evaluate tree mortality and damage trends on permanent plots in Pacific silver firestands.

FS-2-e4(Unnumbered)-PNW

Line Project Title: Sitka spruce weevil - biology, ecology, and control.

K. H. Wright, and P. E. Buffam

Study Objectives: (a) To measure and evaluate the importance of the weevil in Sitka spruce stands in Oregon and Washington, and (b) to test resistance of other spruce species and hybrids to the weevil.

FS-2-e5-2-PNW

J. F. Wear and W. G. Guy

Line Project Title: Insect aerial surveys - development of methods.

Study Objectives: To develop and improve aerial techniques and equipment for locating and evaluating insect outbreaks and tree mortality in major timber types of western states.

OREGON STATE COLLEGE

1. Mass rearing of the Douglas-fir beetle. R. F. Schmitz.
2. Population dynamics of the Douglas-fir beetle. J. A. Rudinsky, R. F. Schmitz, L. N. Kline, W. H. Hendrickson.
3. Environmental factors influencing the rearing of spruce budworm under laboratory conditions. G. B. Pitman, J. A. Rudinsky (In cooperation with the Forest Service).
4. Resistance of conifers to bark beetle infestation. J. A. Rudinsky I. Otvos. (In cooperation with Boyce Thompson Institute.)
5. Factors influencing bark beetle flights in ponderosa pine. R. I. Gara, J. A. Rudinsky. (In cooperation with Boyce Thompson Institute.)
6. Biologies, distribution and destructiveness of five species of bark beetles in coniferous forests of western Oregon. D. G. Fellin P. O. Ritcher, J. A. Rudinsky.

PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION

<u>New No.</u>	<u>Title</u>
FS-2-e1	<u>BARK BEETLES AFFECTING FOREST AND SHADE TREES</u>

FS-2-e1-1 Studies in the control of pine bark beetles through the classification of trees according to their susceptibility to attack and by the selective logging of susceptible

- trees from infested stands.
Assignment: Eaton, Hall, Struble, Wickman
- FS-2-e1-2 Interrelation of fire and insects in pine stands.
Assignment: Struble
- FS-2-e1-8 Resistance of trees to bark beetles.
Assignment: Smith
- FS-2-e1-9 Studies to develop or improve methods of preventing or controlling miscellaneous bark beetles through the use of toxic oil sprays.
Assignment: Lyon
- FS-2-e1-10 Mountain pine beetle - ecology and control.
Assignment: Struble
- FS-2-e3 DEFOLIATING INSECTS AFFECTING FOREST AND SHADE TREES
- FS-2-e3-4 Needle sheath miner, a pest of young pines.
Assignment: Stevens
- FS-2-e3-7 Resistance of trees to insects other than bark beetles.
Assignment: Smith
- FS-2-e3-11 Lodgepole needle miner--biology ecology and control.
Assignment: Lyon, Stevens, Struble
- FS-2-e4 INSECTS OTHER THAN BARK BEETLES AND DEFOLIATORS AFFECTING FOREST AND SHADE TREES
- FS-2-e4-7 Insects destructive of the flowers, seeds and cones of trees--biology, ecology and control.
Assignment: Koerber
- FS-2-e5 DEVELOPMENT OF METHODS FOR CONDUCTING FOREST INSECT SURVEYS
- FS-2-e5-1 Studies of methods for improving the accuracy and efficiency of forest insect ground surveys.
Assignment: DeMars, Hall, Stevens, Wickman
- FS-2-e5-2 Studies of methods for conducting forest insect surveys from the air.
Assignment: DeMars, Hall, Stevens, Wickman
- FS(Unnumbered) SURVEYS AND CONTROL OF FOREST INSECT PESTS
- Conduct and coordination of forest insect surveys in Region 5.
Assignment: DeMars, Hall, Stevens, Wickman, Jessen

UNIVERSITY OF CALIFORNIA

1. The Scolytidae of California. Part of a larger California Insect Survey Project of the University. R. W. Stark, D.L. Wood.
2. Biology and ecology of a Neodiprion sawfly attacking ponderosa pine plantations. D.L. Dahlsten, R. W. Stark.
3. Biology and ecology of the Monterey pine cone beetle, Conophthorus radiatae Hopkins. C. H. Schaefer.
4. Cone and seed insects attacking forest trees of California with particular reference to the cone beetles. (Coleoptera: Scolytidae: Conophthorus). R. W. Stark, D. L. Wood.
5. Host selection by Ips and related genera of bark beetles. D. L. Wood and R. W. Stark.
6. Population dynamics of the western pine beetle, Dendroctonus brevicomis LeConte. R. W. Stark and D. L. Wood.
7. Media for the rearing of immature bark beetles (Scolytidae). W. D. Bedard (terminates June, 1961).
8. Mites predacious on bark beetle eggs. W. D. Bedard, E. Lindquist (terminates June, 1961).
9. Radiographic techniques in the detection, sampling and biological studies of wood-boring insects. A. A. Berryman and R. W. Stark.
10. Survey of the nematodes infesting bark beetles in California. William R. Nickle of the Department of Plant Nematology at the Davis campus.

BOYCE THOMPSON INSTITUTE FOR PLANT RESEARCH, Inc.

BTI-Project 59: "The Life Habits and Control of Bark Beetles"

Personnel assigned: J. P. Vite and Robert I. Gara

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Line Project Number: FS-2-e4-3-INT

Line Project Title: Sucking insects other than the balsam woolly aphid - biology, ecology and control. Washburn.

Objectives:

1. To determine life history and habits of the spruce mealybug Puto sp.
2. To determine the influence of insect predators or parasites on its abundance.

Line Project Number: FS-2-e3-13-INT

Line Project Title: The larch casebearer--biology, ecology and control. Denton.

Objectives:

1. To record the establishment and spread of the larch casebearer in western larch.
2. To determine the extent of natural control by parasites.
3. To determine the possibilities of biological control by introducing one or more species of parasites known to be effective in the eastern half of the country.

Line Project Number: FS-2-e3-5-INT

Line Project Title: Diseases of forest insects other than bark beetles. Cole.

Objectives:

1. To identify the infectious diseases of important species of forest insects other than bark beetles.
2. To develop methods and techniques for studying these diseases and for propagating and otherwise handling effective ones.
3. To determine the effect of these diseases on their hosts, and the possibility of artificially establishing them in infested stands where they do not occur naturally.

Line Project Number: FS-2-e1-1-INT

Line Project Title: Tree classification based on susceptibility to pine beetles, and selective logging. (Formerly two line projects, combined in revision of 12/17/58) Johnson.

Objectives:

To determine in Forest Service Region 1, (1) the prevalence of high risk trees in typical operable ponderosa pine stands, (2) the rate and cause of subsequent changes in applied risk ratings, (3) the degree to which the western pine beetle will attack trees of different risk ratings, (4) the demonstration of applications of the ponderosa pine risk rating system, and (5) to determine the effectiveness of the risk rating system in preventing outbreaks of the western and mountain pine beetles in old-growth ponderosa pine stands.

Line Project Number: FS-2-e3-2-INT

Line Project Title: Spruce budworm--biology, ecology, and natural control. Cole.

Objectives:

1. To correlate spruce budworm population levels with damage to host tree species, including both growth loss and mortality and to define damage.
2. To determine factors governing rise and fall of spruce budworm populations, measure the effectiveness of these factors, and develop methods of predicting trends from field collected population data.

Line Project Number: FS-2-el-5-INT

Line Project Title: Douglas-fir beetle--biology, ecology and control. Furniss.

Objectives:

1. To develop a system of sampling populations of Douglas-fir beetle.
2. To develop a system of sampling the natural enemies of Douglas-fir beetle and determining their effectiveness.

UNIVERSITY OF IDAHO

1. The biology of Conophthorus monticolae Hopk. in Northern Idaho. M. S. thesis, nearing completion by D. L. Williamson.
2. The Biology and Ecology of Dioryctria abietella (D & S) in Northern Idaho. In initial phases by J. A. Schenk.
3. Barbara colfaxiana (Kearff) as a pest of Douglas-fir Cones in Northern Idaho. E. C. Clark. Completed. To be published as F.W.R. Exp't. Sta. Res. Note; Spring, 1961.

4. On the Damage Caused by the Engelmann Spruce Weevil in Idaho. E.C. Clark. Completed. Manuscript in process of revision. To be published, probably in Jour. For. in near future.
5. Other projects initiated by Dr. E. C. Clark and in various stages of completion. (Titles are tentative and not those of Dr. Clark.)
 - a. Seed Loss in Douglas-fir Attributable to the Douglas-fir Cone Midge, Contarinia oregonensis Foote. Some raw data only. Analysis and completion of this study is scheduled.
 - b. Seed Loss in Western White and Ponderosa Pines Attributable to Laspryresia spp. Some raw data. Analysis and completion of this study is scheduled.
 - c. Determination of Megastigmus Infested Seed by Flotation Methods. Planning stage only. No future scheduling as yet.
6. The Identification, Biology and Ecology of the Major Cone and Seed Insects of Idaho Conifers. J. A. Schenk. Idaho's contributory project to W-72. (Active).

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

1. Engelmann spruce beetle--biology, ecology and control.
R. H. Nagel, W. F. McCambridge
2. Black Hills beetle--biology, ecology and control.
N. D. Wygant, W. F. McCambridge
3. The biology, ecology, and control of the Douglas-fir tussock moth. M. J. Stelzer
4. Studies of methods for improving the accuracy and efficiency of forest insect ground surveys.
B. H. Wilford, M. E. McKnight, F. M. Yasinski, John F. Chansler
5. Studies of methods for conducting forest insect surveys from the air.
6. Southwestern, roundheaded, and Colorado pine beetles and associated bark beetles.
C. L. Massey, H. E. Ostmark
7. Diseases of forest insects other than the bark beetles.
C. L. Massey, M. J. Stelzer

MEMBERSHIP ROSTER

WESTERN FOREST INSECT WORK CONFERENCE

Note: Active members registered at the conference in Berkeley, California, March 1-3, 1961, are indicated by an asterisk (*).

REGIONS 1 & 4 USFS (Ogden)

CAHILL, DONALD B.
(Entomologist)
Division of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
Forest Service Building
Ogden, Utah

*COLE, WALTER E.
(Entomologist)
Division of Forest Insect Research
Intermountain Forest & Range
Experiment Station
U. S. Forest Service
Forest Service Building
Ogden, Utah

COX, ROYCE E.
(Forester)
Potlatch Forests, Inc.
Lewiston, Idaho

DAVIS, Dr. DONALD A.
(Associate Professor)
Dept. of Zoology & Entomology
Utah State University
Logan, Utah

DENTON, ROBERT E.
(Entomologist)
Forest Insect Laboratory
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
Federal Building
Missoula, Montana

*FELLIN, DAVID G.
(Entomologist)
Forest Insect Laboratory
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
Federal Building
Missoula, Montana

*FURNISS, MALCOIM M.
(Entomologist)
Boise Research Center
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
316 East Myrtle St.
Boise, Idaho

GROSSENBAACH, PAUL
(Forester)
Regional Office
U. S. Forest Service
Forest Service Bldg.
Ogden, Utah

*HARTMAN, HOMER J.
(Forester)
Div. of State & Private Forestry
Region 1
U. S. Forest Service
Federal Building
Missoula, Montana

*JOHNSON, PHILIP C.
(Entomologist In Charge)
Forest Insect Laboratory
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
Federal Building
Missoula, Montana

*KNOPF, JERRY A. E.
(Entomologist)
Div. of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U. S. Forest Service
Forest Service Building
Ogden, Utah

REGIONS 1 & 4 USFA (Ogden)
(Cont.)

KNOWLTON, Dr. GEORGE F.
(Professor of Entomology)
Utah State University
Logan, Utah

MALOY, Dr. OTIS C.
(Plant Pathologist)
Potlatch Forests, Inc.
Lewiston, Idaho

MANIS, Dr. H.C.
(Head)
Dept. of Entomology
University of Idaho
Moscow, Idaho

McGREGOR, M.D.
(Entomologist)
Div. of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Forest Service Building
Ogden, Utah

PARKER, D.E.
(Chief)
Div. of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Forest Service Building
Ogden, Utah

*SCHENK, Dr. JOHN A.
(Associate Professor)
University of Idaho
Moscow, Idaho

*SCOTT, DAVID O.
(Forester)
Regional Office
U.S. Forest Service
Federal Building
Missoula, Montana

STANFORD, Dr. J.S.
(Professor Emeritus)
Utah State University
Logan, Utah

TERRELL, TOM T.
(Entomologist)
Forest Insect Laboratory
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Federal Building
Missoula, Montana

*TROSTLE, GALEN C.
(Entomologist)
Div. of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Forest Service Building
Ogden Utah

*TUNNOCK, ARCHIBALD, Jr.
(Entomologist)
Forest Insect Laboratory
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Forest Service Building
Missoula, Montana

*WASHBURN, RICHARD I.
(Entomologist)
Div. of Forest Insect Research
Intermountain Forest &
Range Experiment Station
U.S. Forest Service
Forest Service Building
Ogden, Utah

REGIONS 2 & 3 USFS (FORT COLLINS)

*BAILEY, WILMER F.

(Forester)
Div. of Timber Management
U.S. Forest Service
Denver Federal Center, Bldg. 85
Denver 25, Colorado

BALDWIN, Dr. PAUL

(Zoologist)
Department of Zoology
Colorado State University
Fort Collins, Colorado

BORDEN, TOM B.

(State Forester)
Colorado State Forest Service
Braiden Hall, C.S.U.
Fort Collins, Colorado

CHANSLER, JOHN F.

(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
P.O. Box 523
Albuquerque, New Mexico

CHILDS, F.

National Park Service
Omaha, Nebraska

DURKIN, J.J.

Dept. of Entomology
New Mexico A & M College
State College, New Mexico

FIELD, ERNEST

(Forester)
307 Fed. Office Bldg.
National Park Service
Omaha, Nebraska

*HESTER, D.A.

(Forester)
Div. of Timber Management
U.S. Forest Service
Denver Federal Center, Bldg. 85
Denver, Colorado

*JAMES, WILLIAM

(Regional Chief)
National Park Service
Branch of Park Forest &
Wildlife Protection, Box 1728
Santa Fe, New Mexico

*LANDGRAF, AMEL E., Jr.

(Forester)
Div. of Timber Management
U.S. Forest Service
Denver Federal Center, Bldg. 85
Denver 25, Colorado

*McCAMBRIDGE, W.F.

(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
South Hall, C.S.U.
Fort Collins, Colorado

McKNIGHT, MELVIN, E.

(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
South Hall, C.S.U.
Fort Collins, Colorado

MASSEY, Dr. CALVIN L.

(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
P.O. Box 523
Albuquerque, New Mexico

MESO, STANELY, W., Jr.

(Forester)
Div. of Timber Management
U.S. Forest Service
Denver Federal Center, Bldg. 85
Denver 25, Colorado

MOGREN, Dr. E.W.

(Associate Professor)
College of Forestry &
Range Management
Colorado State University
Fort Collins, Colorado

REGIONS 2 & 3 USFS
(Cont.)

NAGEL, ROY H.
(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
South Hall, C.S.U.
Fort Collins, Colorado

OSTMARK, H. EUGENE
(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
P.O. Box 523
Albuquerque, New Mexico

PIERCE, D.A.
(Entomologist)
U.S. Forest Service
Regional Office
Region 3
Albuquerque, New Mexico

PILBOME, RICHARD E.
(Res. Biologist-Pesticide Project)
Bureau of Sport Fisheries & Wildlife
Denver Research Center
Denver Federal Center, Bldg. 85
Denver 25, Colorado

*RIVAS, A.M.
(Forester)
U.S. Forest Service
Regional Office
Albuquerque, New Mexico

*STELZER, MILTON J.
(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
P.O. Box 523
Albuquerque, New Mexico

THATCHER, Dr. T.O.
(Professor)
Dept. of Entomology
Colorado State University
Fort Collins, Colorado

WERNER, Dr. F.C.
Dept. of Entomology
University of Arizona
Tucson, Arizona

*WILFORD, Dr. B.H.
(Entomologist)
Rocky Mountain Forest &
Range Experiment Station
South Hall, C.S.U.
Fort Collins, Colorado

WYGANT, Dr. NOEL D.
(Chief)
Div. of Forest Insect Research
Rocky Mountain Forest &
Range Experiment Station
221 Forestry Building, C.S.U.
Fort Collins, Colorado

*YASINSKI, F.M.
(Entomologist)
U.S. Forest Service
Regional Office
Albuquerque, New Mexico

REGION 5 USFS (BERKELEY)

*ARNOLD, Dr. KEITH
(Director)
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California

*AVERELL, J.L.
(Forester)
U.S. Forest Service
630 Sansome St.
San Francisco 11, California

*BEDARD, W.D.
(Research Assistant)
Dept. of Entomology & Parasitology
Agriculture Hall
University of California
Berkeley 4, California

REGION 5 USFS (BERKELEY)
(CONT.)

- *BERRYMAN, A.A.
(Research Assistant)
Dept. of Entomology
University of California
Berkeley 4, California
- *BUSHING, R.W.
(Entomologist)
Div. of For. Insect Research
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *CHAFFEE, R.R.
Forest Genetics Research
Foundation
American Trust Building
Berkeley, California
- *DAHLSTEN, D.L.
(Research Assistant)
Dept. of Entomology &
Parasitology
Agriculture Hall
University of California
Berkeley 4, California
- *DeMARS, C.J.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *DOTTA, DANIEL D.
(Forest Technician)
California Div. of Forestry
State Office Bldg. No. 1
Room 354
Sacramento 14, California
- *DROWN, E.A.
(Forester)
Bureau of Land Management
Room 801, California Fruit Bldg.
Sacramento 14, California
- *EATON, CHARLES, B.
(Chief)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *FERGUSON, Dr. WILLIAM
Department of Entomology
University of California
Berkeley, California
- *FLESCHNER, Dr. C.A.
Dept. of Biological Control
University of California
Riverside, California
- *HALL, Dr. RALPH C.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- HARPER, Dr. R.W.
(Chief)
Bureau of Entomology
Calif. Dept. of Agriculture
1220 N Street
Sacramento 14, California
- *HARRIS, T.H.
(Forester)
U.S. Forest Service
630 Sansome St.
San Francisco 11, California
- *HAWTHORNE, Dr. R.
(Entomologist)
Bureau of Entomology
1220 N Street
Sacramento, California
- *HOWDEN, W.R.
(Forester)
U.S. Forest Service
630 Sansome Street
San Francisco 11, California

REGION 5 USFS (BERKELEY)
(Cont.)

- *HUFFACKER, Dr. CARL
Department of Biological Control
University of California
Berkeley, California
- *HUNT, R.H.
Department of Fish & Game
722 Capitol Avenue
Sacramento, California
- *JESSEN, ERIC
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *JOHNSON, CLIFFORD
Division of Natural Resources
Humboldt State College
Arcater, California
- KEEN, F.P.
1054 Oak Hill Road
Lafayette, California
- *KOERBER, T.W.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *LINBERG, LEONARD E.
(Forester)
U.S. Plywood Corp.
Log-Timber Department
784 18th Street
Arcater, California
- *LYON, R.L.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California
- *MABEN, R.
(Forester)
Winton Lumber Company
Martell, California
- *MAHONEY, JOHN
(Forester)
National Park Service, R-4
180 New Montgomery St.
San Francisco, California
- *MARSHALL, KNOX
Western Pine Association
1100 Tenth Avenue
Sacramento 18, California
- *MASSON, JOHN
(Forester)
Collins Pine Company
Chester, California
- McKENZIE, H.L.
(Systematic Entomologist)
Dept. of Entomology & Parasitology
University of California
Davis, California
- *MESSENGER, Dr. P.S.
Department of Biological Control
1050 San Pablo Avenue
Albany, California
- *MUELDER, D.W.
(Professor)
School of Forestry
University of California
Berkeley 4, California
- *PIERCE, J.R.
(Entomologist)
c/o Supervisor, San Bernardino
National Forest
P.O. Box 112
San Bernardino, California
- *SCHAEFER, CHARLES H.
(Research Assistant)
Dept. of Entomology
University of California
Berkeley 4, California

REGION 5 USFS (BERKELEY)
(Cont.)

*SHARP, R.W.
(Forester)
National Park Service
Yosemite National Park
California

*SIMMONS, NED
Div. of Natural Resources
Humboldt State College
Arcater, California

*SMITH, Dr. RAY F.
(Chairman)
Dept. of Entomology & Parasitology
Agriculture Hall
University of California
Berkeley 4, California

*SMITH, RICHARD H.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California

*STARK, Dr. R.W.
(Assistant Professor)
Dept. of Entomology & Parasitology
University of California
Berkeley 4, California

*STEVENS, ROBERT E.
(Entomologist)
Div. of Forest Service Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California

*STRUBLE, G.R.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California

*STURGEON, Dr. E.E.
Division of Natural Resources
Humboldt State College
Arcata, California

*SWAIN, K.M.
(Entomologist)
U.S. Forest Service
630 Sansome St.
San Francisco 11, California

*VITE, Dr. JEAN PIERRE
B.T.I. For. Research Laboratory
P.O. Box 1119
Grass Valley, California

*WICKMAN, BOYD E.
(Entomologist)
Div. of Forest Insect Res.
Pacific Southwest Forest &
Range Experiment Station
P.O. Box 245
Berkeley 1, California

*WOOD, Dr. D.L.
(Assistant Entomologist)
B.T.I. For. Research Laboratory
P.O. Box 1119
Grass Valley, California

REGION 6 USFS (PORTLAND)

ALLEN, DON G.
(Entomologist)
Oregon For. Lands Res. Center
P.O. Box 571
Corvallis, Oregon

BEVER, DALE N.
(Director)
Oregon For. Lands Res. Center
E.O. Box 571
Corvallis, Oregon

BROCKMAN, Dr. C. FRANK
(Professor of Forestry)
College of Forestry
University of Washington
Seattle, Washington

REGION 6 USFS (PORTLAND)
(Cont.)

BUCKHORN, W.J.
(Entomologist)
U.S. Forest Service
P.O. Box 4137
Portland 8, Oregon

*BUFFAM, P.E.
(Entomologist)
U.S. Forest Service
P.O. Box 4137
Portland 8 Oregon

*CAROLIN, V.M., Jr.
(Entomologist)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

CHAMBERLIN, Dr. W.J.
3320 Chintimini Avenue
Corvallis, Oregon

CUMMINGS, WILLIAM H.
(Director)
Research Center
Weyerhaeuser Company
P.O. Box 420
Centralia, Washington

CORNELIUS, ROYCE O.
(Managing Forester)
Weyerhaeuser Company
Tacoma Building
Tacoma 1, Washington

COULTER, WILLIAM K.
(Entomologist)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

FURNISS, R.L.
(Chief)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

*GUY, W.C.
(Photographer)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

HOPKINS, DONALD R.
(Assistant Supervisor)
Div. of Forest Management
State Dept. of Natural Resources
Box 110
Olympia, Washington

*HOWARD, BENTON
(Forester)
U.S. Forest Service
P.O. Box 4137
Portland 8, Oregon

JAENICKE, A.J.
2941 Mulkey Street
Corvallis, Oregon

JAMES, Dr. MAURICE T.
(Professor of Entomology)
Dept. of Zoology
Washington State University
Pullman, Washington

*JOHNSON, N.E.
(Entomologist)
Weyerhaeuser Company
P.O. Box 420
Centralia, Washington

KLEIN, WILLIAM H.
(Entomologist)
U.S. Forest Service
P.O. Box 4137
Portland 8, Oregon

KOLBE, E.L.
(Forester)
Western Pine Association
Yeon Building
Portland 4, Oregon

KRYGIER, J.T.
(Professor)
School of Forestry
Oregon State College
Corvallis, Oregon

REGION 6 USFS (PORTLAND)
(Cont.)

LARSEN, A.T.
(Forester-Pilot)
Oregon State Bd. of Forestry
2600 State Street
Salem, Oregon

*LAUTERBACH, PAUL G.
(Research Forester)
Weyerhaeuser Company
P.O. Box 420
Centralia, Washington

*MITCHELL, Dr. RUSSEL G.
(Entomologist)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

ORR, PETER W.
(Entomologist)
U.S. Forest Service
P.O. Box 4137
Portland 8, Oregon

*PEARSON, ERNEST D.
(Forester)
Oregon State Bd. of Forestry
Salem, Oregon

*REDISKE, J.H.
(Plant Physiologist)
Weyerhaeuser Company
P.O. Box 420
Centralia, Washington

RICHER, Dr. PAUL O.
(Head)
Department of Entomology
Oregon State University
Corvallis, Oregon

RUDINSKY, Dr. JULIUS A.
(Professor)
Entomology Department
Oregon State University
Corvallis, Oregon

*RYAN, Dr. ROGER
(Entomologist)
c/o Entomology Department
Oregon State University
Corvallis, Oregon

*TELFORD, Dr. HORACE S.
(Chairman)
Dept. of Entomology
Washington State University
Pullman, Washington

THOMAS, G.M.
(Entomologist)
c/o Entomology Department
Oregon State University
Corvallis, Oregon

THOMPSON, Dr. C.G.
(Entomologist)
c/o Entomology Department
Oregon State University
Corvallis, Oregon

WEAR, J.F.
(Research Forester)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

WEAVER, HAROLD
(Forester)
Bureau of Indian Affairs
P.O. Box 4097
Portland 8, Oregon

WILLIAMS, CARROLL B., Jr.
(Research Forester)
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

*WRIGHT, KENNETH H.
(Entomologist)
Div. of Forest Insect Res.
Pacific Northwest Forest &
Range Experiment Station
P.O. Box 4059
Portland 8, Oregon

REGION 10 USFS (JUNEAU)

DOWNING, GEORGE L.
(Entomologist)
U.S. Forest Service
630 San Some St.
San Francisco 11, California

ROSE, W.E.
(Entomologist)
U.S. Forest Service
Box 740
Juneau, Alaska

WASHINGTON, D.C.

BAKER, W.L.
(Assistant Director)
Div. of Forest Insect Res.
U. S. Forest Service
Washington 25, D.C.

BEAL, Dr. J.A.
(Director)
Div. of Forest Insect Res.
U.S. Forest Service
Washington 25, D.C.

*BENEDICT, W.V.
(Director)
Div. of Forest Pest Control
U.S. Forest Service
Washington 25, D.C.

*BONGBERG, J.W.
(Chief)
Branch of Forest Insect Surveys
U.S. Forest Service
Washington 25, D.C.

HARPER, Dr. V.L.
(Assistant Chief)
U.S. Forest Service
Washington 25, D.C.

*MOORE, A.D.
Div. of Forest Insect Res.
Beltsville Forest Insect Lab.
U.S. Forest Service
Washington 25, D.C.

*WHITESIDE, J.M.
(Assistant Director)
Div. of Forest Pest Control
U.S. Forest Service
Washington 25, D.C.

ALBERTA (CALGARY)

BROWN, C.E.
(Associate Forest Biologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

COOK, J.A.
(Associate Forest Biologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

*HOPPING, GEORGE R.
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

McGUFFIN, Dr. CLAYTON
(Forest Biologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

*REID, ROBERT WILLIAM
(Forest Biologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

*SHEPHERD, R.F.
(Forest Biologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
102 11 Avenue, East
Calgary, Alberta

BRITISH COLUMBIA (VICTORIA & VERNON)

ATKINS, M.D.
(Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

CHAPMAN, Dr. JOHN A.
(Senior Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

CONDRASHOFF, SERGEI
(Forest Entomologist)
Forest Entomology Laboratory
Canada, Department of Forestry
Box 1030
Vernon, B.C.

DYER, E.D.A.
(Associate Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

EDWARDS, Dr. D.K.
(Associate Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

*EVANS, D.
(Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

*GRAHAM, Dr. KENNETH
(Professor of Forest Entomology)
Department of Zoology
Biological Sciences Building
University of British Columbia
Vancouver 8, B.C.

HARRIS, JOHN W.E.
(Associate Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

HEDLIN, A.F.
(Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

JEWESSON, R.S.
Forestry Department
Canadian Forest Products Ltd.
Camp N
Beaver Cove, B.C.

KINGHORN, J.M.
(Senior Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

*LEJEUNE, R.R.
(Officer in Charge)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

McKINNON, F.S.
(Chief Forester)
B.C. Forest Service
Parliament Buildings
Victoria, B.C.

*McMULLEN, Dr. L.H.
(Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

BRITISH COLUMBIA (VICTORIA AND VERNON)
(Cont.)

MATHERS, W.G.
(Administrative Officer)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

MORRIS, Dr. O.N.
(Associate Insect Pathologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

RICHMOND, H.A.
(Consulting Forest Entomologist)
Lofthouse Road
R.R. #2
Nanaimo, B.C.

*ROSS, Dr. D.A.
(Officer In Charge)
Forest Entomology Laboratory
Canada, Department of Forestry
Box 1030
Vernon, B.C.

*SILVER, Dr. G.T.
(Senior Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

SMITH, D.N.
(Associate Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

SPENCER, Prof. G.J.
Department of Zoology
University of British Columbia
Vancouver 8, B.C.

SPILSBURY, R.H.
(Forester In Charge)
Research Division
B.C. Forest Service
Victoria B.C.

THOMSON, M.G.
2226 West 35th Avenue
Vancouver 15, B.C.

WELLINGTON, Dr. W.G.
(Principal Forest Entomologist)
Forest Entomology & Pathology Lab.
Canada, Department of Forestry
409 Federal Building
Victoria, B.C.

TOMCHENKO, SINOWY
1182 Kelowna Street
Vancouver, B.C.

OTTAWA

FETTES, Dr. J.J.
(Head, Chemical Control Section)
Forest Entomology & Pathology Branch
Canada, Department of Forestry
Central Experimental Farm
K.W. Neatby Building
Ottawa, Canada

GRAY, D.E.
(Assistant Director)
Forest Entomology & Pathology Branch
Canada, Department of Forestry
Room 226 Motor Bldg.
238 Sparks Street
Ottawa, Canada

*McGUGAN, Dr. B.M.
(Associate Director-Forest Zoology)
Forest Entomology & Pathology Branch
Canada, Department of Forestry
Room 226 Motor Building, 238 Sparks St.
Ottawa, Canada

PREBBLE, Dr. M.L.
(Director)
Forest Entomology & Pathology Branch
Canada, Department of Forestry
Room 226, Motor Bldg.
238 Sparks St.
Ottawa, Canada

ENTOMOLOGISTS OUTSIDE GEOGRAPHICAL
BOUNDARY OF W.F.I.W.C.

*GRAHAM, Dr. S.A.
(Entomologist)
School of Natural Resources
Department of Forestry
University of Michigan
Ann Arbor, Michigan

HARVEY, Dr. GEORGE T.
Forest Entomology Laboratory
Sault Ste. Marie
Ontario, Canada

KNIGHT, Dr. FRED B.
(Associate Professor)
School of Natural Resources
Department of Forestry
University of Michigan
Ann Arbor, Michigan

COMMON NAMES COMMITTEE PROGRESS REPORT

The following items were reported by Phil Johnson at the first business session of the 12th Western Forest Insect Work Conference at Berkeley, California on March 1, 1961:

1. Formation of the new Common Names Committee immediately following the 11th Conference in Ogden in March 1960.
2. The Committee Chairman completed review of all correspondence by previous Conference committees and noted the actions taken.
3. All Committee correspondence was segregated by years and filed at Missoula.
4. The Committee had for its first business the consideration of a suggested common name "Douglas-fir seed midge" for Contarinia oregonensis Foote, proposed by committee member Alan F. Hedlin, Victoria, B. C.
5. The Committee has under consideration a standardized reporting form for membership use in proposing common names of western forest insects.
6. The Committee chairman mimeographed and distributed to Conference members CNC 11sts 2A and 3 as a guide in proposing common names.
7. An informal brochure was prepared by the Committee chairman for all CNC members including:
 - a. Names of CNC members and Committee chairman for the period 1955-61.
 - b. Permanent references dealing with procedures and proposing common names to the Committee on common names, Entomological Society of America.
 - c. Lists of suggested common names for some western forest insects (Lists 2A and 3).
 - d. A copy of the rules of order covering the business of the CNC of the Western Forest Insect Work Conference.
 - e. Definitions of "western", "forest insect", etc., for help in delineating the geographic and subject matter of the CNC committee.

MINUTES OF MEETING OF COMMON NAMES COMMITTEE

The meeting was called to order at 7:00 p.m. by Chairman Johnson in a room of the Hotel Durant. The following committee members were present: Valentine M. Carolin, Jr., Portland; David Evans, Victoria; Norman E. Johnson, Berkeley (Centralia, Wash.); Philip C. Johnson, Missoula, Montana, chairman; George R. Struble, Berkeley; and Bill H. Wilford, Fort Collins, Colorado, ex officio.

Guests present included Charles B. Eaton, Berkeley; George R. Hopping, Calgary; and Charles Schaeffer, Berkeley.

The Committee reviewed the list of 20 names furnished the Committee members earlier this year by Val Carolin and discussed proposed common names. The following action was taken:

1. The Committee approved the following common names:

Douglas-fir cone moth (Barbara colfaxiana (Kearf.))

Ponderous borer (Ergates spiculatus Lec.)

Emarginate ips (Ips emarginatus (Lec.))

Arizona five-spined ips (Ips lecontei Sw.)

Oregon ips (Ips oregonis (Elchh.))

Monterey pine ips (Ips radiatae Hopk.)

Western drywood termite (Kaloterms minor (Hagen))

Flatheaded pine borer (Melanophila gentilis (Lec.))

Western platypus (Platypus wilsoni Sw.)

Pine needle-sheath miner (Zelleria haimbachi Busck)

Coastal dampwood termite (Zootermopsis angusticollis (Hagen))

2. The Committee could not agree on common names for the following forest insects:

Dioryctria abietella D.&S. (recommended waiting for taxonomic clarification).

Dioryctria auranticella (Grote) (recommended waiting for taxonomic clarification).

Malacosoma constricta Stretch (no reason stated; probably Committee opinions too diverse).

Xylotrechus nauticus (Mann.) (no agreement on any common names proposed to date).

3. The Chairman was instructed to write to Jim Kinghorn at Victoria to seek his opinion on common names for Gnathotrichus retusus (Lec.) and G. sulcatus (Lec.). Members present indicated a strong inclination to accept any common names proposed by Mr. Kinghorn for these two species.

4. George Struble was directed to contact Dr. Gorton E. Linsley, Berkeley, to check the reported use by Dr. Linsley of the common name "California deathwatch beetle" for Hadrobregmus gibbicollis (Lec.) in a 1943 publication. If the use of this common name by Dr. Linsley could be substantiated, there appeared to be favorable sentiment for its adoption by the Committee.

5. George Hopping agreed to furnish justification statements for common names of Ips species approved by the Committee at this meeting (See 1 above.).

6. Val Carolin was directed to contact William K. Coulter, Portland, and, together, to consider common names for Pseudohylesinus grandis Sw. and P. granulatus (Lec.). The Committee indicated a strong inclination to accept any common names proposed by these men for these two species.

7. The Committee agreed to add Contarinia oregonensis Foote to the list of names that should receive early consideration for common naming, since the common name--Douglas-fir seed midge--proposed by Alan Hedlin, Victoria, did not meet with Committee approval. Extracted comments of Committee members would be attached.

The Chairman was directed to write to Alan Hedlin and explain the Committee action regarding Mr. Hedlin's proposed common name for Contarinia oregonensis Foote.

The Chairman was directed to circularize the Conference membership to obtain its approval or rejection of common names approved by the Committee at this meeting.

The Chairman was directed to search the earlier correspondence of Committee actions to ascertain the reasons for ESA rejection of certain common names proposed by the Conference from List 2A; and to provide Committee members with a list of these reasons and names as a prelude to reconsideration of the proposal.

A suggested form for the proposal of common names of western forest insects by Conference members, previously circulated to Committee members by the Chairman, was discussed. Certain minor changes in format were discussed and the Chairman was authorized to make the necessary changes and to process and distribute the form. It was agreed that copies of the form should be stocked at several locations accessible to the Conference membership. The members are to be notified by the Conference Secretary of the availability of the form and urged to use it in sending common name proposals to our Committee.

The meeting was adjourned at 10:00 p.m.

Respectfully submitted,

/s/ Philip C. Johnson

PHILIP C. JOHNSON
Acting Secretary
Common Names Committee

---O---